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WATER RESOURCES RESEARCH

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HEARINGS
BEFORE THE
SUBCOMMITTEE ON
IRRIGATION AND RECLAMATION
OF THE
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
UNITED STATES SENATE
EIGHTY-NINTH CONGRESS
FIRST SESSION
ON
S. 22
A BILL TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM
OF WATER RESEARCH

MARCH 2 AND 3, 1965

Printed for the use of the
Committee on Interior and Insular Affairs



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WATER RESOURCES RESEARCH

TUESDAY, MARCH 2, 1965

U.S. SENATE,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to call, at 10 a.m. in room 3110, New Senate Office Building, Senator Clinton P. Anderson (chairman of the subcommittee) presiding.

Present: Senators Anderson, Moss, Burdick, Kuchel, Allott, and Jordan.

Also present: Jerry T. Verkler, staff director; Stewart French, chief counsel; and Richard N. Little, minority counsel.

Senator ANDERSON. This is an open, public hearing by the Irrigation and Reclamation Subcommittee of the Senate Interior Committee on S. 22, a bill to promote a more adequate national program of water research. Senators Bartlett, Bayh, Bible, Burdick, Carlson, Gruening, Hart, Jackson, Kuchel, Long of Missouri, Mansfield, McGee, McGovern, Metcalf, Morse, Moss, Tower, and Yarborough, joined with me in sponsoring this measure.

I will direct that the text of the bill and any reports the committee may receive on it prior to the time these hearings go to press be printed at this point in the record.

(The data referred to follows:)

[S. 22, 89th Cong., 1st sess.]

A BILL To promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) section 200 of Public Law 88-379 of the Eighty-eighth Congress is repealed and

(b) That there is enacted in lieu thereof the following:

"Sec. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1966, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied."

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 1, 1965.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: This responds to your request for the views of the Department of the Interior on S. 22, a bill to promote a more adequate national program of water research.

We recommend that the bill be enacted.

S. 22 would amend title II of the Water Resources Research Act of 1964. Under title II of the Water Resources Research Act the Secretary of the Interior is authorized to support a program of research into aspects of water problems related to missions of the Department of the Interior. Appropriations of \$1 million per year for 10 fiscal years commencing with fiscal years 1965 are authorized for the program. Money appropriated pursuant to this authority may be used for grants, contracts, matching or other arrangements with educational institutions (except those at which a water resources research institute is maintained pursuant to title I of this act), private institutions, private firms, or individuals and Government agencies, local, State and Federal. The act provides that appropriations may be made to finance grants, contracts and other arrangements only if they are not disapproved by the Senate or House Committees on Interior and Insular Affairs.

S. 22 would not change the purpose of title II of the Water Resources Research Act, but it would enlarge the scope of the program and remove some limitations from it. The bill would make four important changes in title II.

First, appropriations would be authorized at the level of \$5 million for fiscal year 1966. The authorization would increase by \$1 million annually until the level of \$10 million was reached. The authorized ceiling would remain at \$10 million per year thereafter.

Second, the 10-year limit on the authorization for appropriations to carry out title II would be eliminated.

Third, the prohibition against support of research at educational institutions where there is a title I water resources research institute would be dropped.

Fourth, the provisions for legislative committee review of proposed grants, contracts, and other arrangements would be dropped.

We believe that all four of the changes that S. 22 would effect are justifiable and would benefit the program. We therefore support the bill.

As to the first change, in the short life of the Office of Water Resources Research (established in the Department to administer title II), we have received 36 proposals for research activity into water resource problems affecting the Department's missions. These proposals aggregate \$1,750,000 and come from responsible, qualified individuals and organizations. Many of them would be accepted if it were possible to do so within the limitations of the appropriations available. This outpouring of proposals is particularly striking in view of the fact that appropriations under title II have not yet been made. When the limit of authorized appropriations was established at \$1 million per year it could not be known with certainty what level of activity could be anticipated. In supporting the bill that became the Water Resources Research Act the Department was not in a position to predict what level of response would be stimulated by the act. Experience based on the number of proposals received to date demonstrates that \$1 million per year is inadequate, and suggests that an authorization of \$5 million to support the first year's research program is justified. As the program becomes better known, and as more talent and capacity is developed over the next few years, we expect promising proposals to increase, thus justifying a gradually rising appropriation ceiling to \$10 million per year by 1971.

As for establishing the authorization for appropriation without a definite time limit, at least two points should be made: (1) Much of the research that will be undertaken will be of a long-range nature and the prospect of long-term support for it must exist if it is to commence; and (2) water problems will persist and the capacity to analyze and deal with them will grow in the future; this Department's mission will become more important and complex as time goes on and it is reasonable that the program be authorized on a continuing basis.

The third objective of S. 22—dropping the prohibition against associating with institutions maintaining water resource research institutes—makes eminent sense. These institutes and the educational centers where they are located

are likely to be the loci of much of the water resources research capability in the Nation. The Secretary should have the authority to look to that capability to accomplish the purposes of title II. The provision in the bill that support may not be given to research projects otherwise being studied will insure that duplication will not result from dropping this provision of the act.

Fourth, S. 22 would eliminate the authority of the Committees on Interior and Insular Affairs of the House of Representatives and Senate to bar appropriations to fund research projects proposed to be undertaken pursuant to title II of the act.

The last sentence of section 200, title II, requires that each proposed grant or other arrangement be submitted to the Congress to lie before the Committee on Interior and Insular Affairs of the House of Representatives and Senate for 60 days. Appropriations to finance these grants or other arrangements are permitted under the act only if neither committee disapproves them within the 60-day review period.

In approving the Water Resources Research Act the President made reference to this requirement, stating:

"One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation."

S. 22 would carry out the President's request.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 2, 1965.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in response to your request for the views of the Bureau of the Budget on S. 22, to promote a more adequate national program of water research.

S. 22 would repeal section 200 of the Water Resources Research Act of 1964 (Public Law 88-379), and substitute therefor a provision which would authorize appropriations to the Secretary of the Interior of \$5 million in 1966, increasing \$1 million each year thereafter for 5 years, and \$10 million annually thereafter for grants, contracts, matching, or other arrangements for research on water problems related to the mission of the Department of the Interior.

Repeal of section 200 of Public Law 88-379 would eliminate, among others, a provision therein requiring that projects proposed to be initiated under the section must lie before the Committees on Interior and Insular Affairs of the Senate and the House of Representatives for 60 days, and that only if neither committee disapproves them within the review period could funds be appropriated to finance the projects. The President requested deletion of this provision when he approved the Water Resources Research Act on July 17, 1964. We would, therefore, strongly favor action which would remove this undesirable requirement.

S. 22 would change the existing provisions of section 200 by (1) raising the ceiling on and removing the 10-year duration limitation on appropriation authorizations, and (2) removing the prohibition against use of funds under title II by institutes established under title I of the act.

We believe it may be desirable to enable the Secretary of the Interior to make funds under title II available to the institutes established under title I of the act, and would not object to removal of the prohibition. In supporting water research related to the mission of the Department of the Interior, the Secretary should have the freedom to seek the most competent capability. Greatest qualification on a given subject may, in fact, reside with an institute.

As to the enlargement of appropriation authorizations for title II research, the complexity and number of water problems related to the mission of the Department of the Interior appear to be great enough to indicate clearly that \$1 million annually is insufficient to support good research leading to their solution. The bill, S. 2 as the administration supported it in the 88th Congress, provided for the same amounts as contained in S. 22.

Sincerely yours,

PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

Senator ANDERSON. S. 22 would accomplish the purpose stated in its title by amending Public Law 88-376, the Water Resources Research Act. This basic, forward-looking legislation developed from S. 2, a bill I sponsored with other Senators in the 88th Congress, which was the subject of comprehensive public hearings and widespread study and comment.

As introduced and passed by the Senate on April 23, 1963, title II of S. 2 provided grant, matching, and contract funds through which financial assistance would have been available to educational institutions in addition to State land-grant colleges, to private organizations, and to local, State, and Federal agencies to undertake special research in water resource problems.

Our point was that the State land-grant college is not necessarily the best, nor the only, institution in a State that is best qualified to carry out a particular line of research.

The House Interior Committee struck out this provision entirely in reporting the bill, and S. 2 passed the House without it. In conference, we were able to get only a modified, limited part of this program restored.

In addition, an amendment was added requiring that projects under title II must be submitted to the Senate and House Interior Committees prior to any actual appropriation of funds.

In signing S. 2 into law as it came from conference, President Johnson expressed "serious concern" over this provision for a congressional veto of an executive act and asked for its repeal.

Without objection, I will direct that the text of the President's statement of July 17, 1964, on the occasion of the signing of S. 2 into Public Law 88-379 be made a part of the record of these hearings.

(The statement referred to follows:)

[Excerpt from Congressional Record, July 22, 1964, p. 16099]

STATEMENT BY THE PRESIDENT, JULY 17, 1964

The Water Resources Research Act of 1964, which I have approved today, fills a vital need.

Abundant good water is essential to continued economic growth and progress. The Congress has found that we have entered a period in which acute water shortages are hampering our industries, our agriculture, our recreation, and our individual health and happiness.

Assuming a continuation of current practices, by the year 2000 there will not be enough usable water to meet the water requirements of parts of the States of Arizona, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Wisconsin, and Wyoming.

This legislation will help us solve this problem. It will create local centers of water research. It will enlist the intellectual power of universities and research institutes in a nationwide effort to conserve and utilize our water resources for the common benefit. The new centers will be concerned with municipal and regional, as well as with national water problems. Their ready accessibility to State and local officials will permit each problem to be attacked on an individual basis, the only way in which the complex characteristics of each water deficiency can be resolved. The bill contemplates a high degree of interstate cooperation, and I urge that this be encouraged.

In large measure, this legislation is a tribute to the vision and wisdom of Senator Clinton P. Anderson, of New Mexico. He has long recognized the problems. He developed the program. He guided it through Congress. He has been in the forefront of the effort to see that adequate supplies of water are available in all parts of the Nation.

One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation.

Senator ANDERSON. By way of background and in further explanation of the President's position. I will point out that in the 84th Congress we passed the legislation that has become so important to reclamation, popularly known as the Small Reclamation Projects Act, or Public Law 984, 84th Congress.

It so happens that I, along with Senator Russell Long, who then was a member of this committee, and Senator Alan Bible, and the late Frank Barrett, sponsored the bill, the text of which became the law. In the measure as passed the Congress reserved to the Interior Committees of the Senate and House an outright veto over any contract into which the Secretary proposed to enter.

President Eisenhower signed the bill with "great reluctance," and said it would not be implemented until the section impinging upon the jurisdiction of the executive branch was repealed.

Accordingly, early in the next Congress, the 85th, we modified the outright veto provision to provide that no appropriations for a project should be made until the Interior Committees had had a chance to look it over. This provision is found in Public Law 85-47.

President Johnson took the position that a similar provision written into S. 2 of the 88th Congress is a rather thinly disguised interference with the constitutional responsibilities of the Executive and called for its repeal.

S. 22, in rewriting title II of the Water Resources Research Act, would drop the back-door veto.

Those of us who sponsored S. 2 hoped to enlist as many scientists as possible in the effort to solve urgent water problems and to begin to attract graduate students to the water resources field. Five great water regions in the United States are going to be using all water available to them by 1980.

Others are going to have water quality problems which must be solved in the next few years or their economic development will come to a stop.

Trained hydroscintists and water resources research are urgently needed. The limitations on the title II program consequently seem to many of us unrealistic when judged against the Nation's needs.

It is my understanding that the executive branch has adopted regulations for the administration of the S. 2 program which, while allowing applications to be filed under title II, make no provision for the submission of projects to Congress for appropriations.

I regret that, for I would like to see promising water resources research projects, for which competent manpower can be enlisted, move ahead. I hope that witnesses today will indicate any projects which have been proposed to the Office of Water Resources Research under title II, and something of their nature.

My hope that we can amend the act, and bring the program as it was originally conceived into full operation, has increased as a result of the fine leadership we have in the new Office of Water Resources Research.

Dr. Roland Renne, the Director, is a man whose capabilities came to my attention quite a few years ago when I served as Secretary of Agriculture. He was working in the Department of Agriculture at that time. He has since been president of Montana State University at Bozeman. He was called from his post there to serve on a Missouri Basin Survey Commission and on a National Water Policy Commission appointed by President Truman and chaired by the late Morris L. Cooke. He has served on international missions. I know that he recently declined a splendid private foundation offer to remain in public service.

I have every confidence that under Dr. Renne's leadership we will develop an excellent land-grant school system of water research centers. I am equally sure that he could also develop a program, beyond the land-grant college centers, of great worth in meeting pressing water research needs.

The hearing this morning will have Dr. Renne as its first witness, appearing for the Department of the Interior. Dr. Renne, you are a very welcome participant here. But first, I will ask if any other member of the committee wishes to make a statement at this time.

However, at this point I wish to say I have a statement from Senator Birch Bayh which will be put in the record, if there is no objection.

If there are other Senators who wish to submit statements later, they will be included in the record at this point.

(The statements follow:)

STATEMENT OF HON. BIRCH BAYH, A U.S. SENATOR FROM THE STATE OF INDIANA

Mr. Chairman, members of the committee, prior commitments prevent me from personally testifying before you today. However, my absence in no way expresses a lack of interest in these proceedings. On the contrary, I consider the Water Resource Research Act and S. 22 to be of crucial importance in our efforts to insure an adequate water supply for future generations.

In January 1961, the Senate Select Committee on National Water Resources, under the chairmanship of the late Senator Robert Kerr, of Oklahoma, sent to the Senate its notable report on the Nation's water needs and problems. This farsighted statement listed five major areas in which our water program must be upgraded if we are to meet the needs of society.

The passage of the Water Resource Research Act of 1964 marked the enactment of one of these recommendations. The remaining four proposals are incorporated in S. 21, legislation which was unanimously approved by the Senate last week.

The adoption last year of the Water Resource Research Act, under the skillful leadership of our distinguished colleagues from New Mexico, Senator Clinton Anderson, was a landmark in the area of water resource development. This law firmly committed the Federal Government to long-range planning as a necessary prerequisite to the development of a comprehensive water conservation program. However, a series of unfortunate occurrences combined to curtail the effectiveness of the Water Resources Research Act.

I refer, of course, to certain House amendments to title II of the law. Senator Anderson has wisely submitted S. 22, a bill designed to unshackle the program and enable it to fulfill its originally intended purpose. I am happy to cosponsor this piece of legislation.

S. 22, in eliminating the existing section 200 of Public Law 88-379 and substituting new language in its place, will have two important effects. First, the passage of Senator Anderson's proposal will eliminate congressional review of all consultative awards made by the Secretary of Interior. This provision of the existing statute is unnecessarily time consuming. It is an usurpation of executive authority by means of a legislative veto over programs sustained by previously appropriated funds. This is in complete disregard of our concept of separation of powers and should be eliminated from this program.

Second, the passage of S. 22 would increase the amount of funds available for use in obtaining the services of individuals and groups not employed by the recipient of a water resource research grant.

The Kerr committee found that our Nation will have an adequate supply of water only if we invest billions of dollars in pollution control, recycling and storage reservoirs. Authoritative sources tell us that we will have water shortages in 28 States by the year 2000 unless we plan today for the future.

Advancements in industrial technology, the extension of water systems, increased irrigation, population explosion, and our booming affluence have resulted in a great increase in water usage.

Today Americans use three times as much water as they did in 1900. These figures are staggering, but understandable, when we realize that it takes 65,000 gallons of water to produce 1 ton of steel, 7,000 gallons to process 100 cases of tomatoes, 50,000 to 100,000 gallons to test an airplane engine, and 550,000 gallons to air condition a department store.

There is little doubt that a sound, well-coordinated nationwide water policy must be developed. Expert research and scientific study can provide us with the tools to create such programs. The establishment of a water research center in each State, as provided by Public Law 88-379, can greatly aid these efforts. But more is required.

Title II of this act enables the Secretary of Interior to employ the talents of individuals and groups to supplement the work done by water resources research centers. This is an extremely important provision, because not every qualified scientist, foundation, engineer, or institution will be directly employed by the established research center. These consultative funds are necessary to insure participation by all qualified personnel.

The present program authorizes only \$1 million per year for 10 years for these purposes, averaging \$20,000 per year per State.

Inadequate funding and stringent time limitations will not solve a problem of this magnitude.

S. 22 would amend title II so as to authorize \$5 million in fiscal 1966 and an additional \$1 million annually until the sum reached \$10 million per year. This \$10 million yearly authorization would continue until no longer needed.

In my opinion, an authorization of this size is the minimum required to meet this challenge. Certainly, a nation that spends millions of dollars a year on such items as chewing gum, cosmetics, and movies can afford \$10 million a year to insure an unlimited supply of clean, clear, fresh water for future generations.

Water sustains all life and permits all growth and development. No natural resource is more precious. For these reasons, I heartily support S. 22 and hope that it will receive the enthusiastic support of this committee.

U.S. SENATE,
Washington, D.C., March 3, 1965.

HON. CLINTON P. ANDERSON,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is to express my support of S. 22, a bill to promote a more adequate national program of water research.

The proposed legislation would enhance the usefulness of the Water Resources Research Act of 1964 (Public Law 88-379), of which I was a cosponsor. It would authorize substantially larger appropriations for the Secretary of the Interior to carry out the purposes of title II of the act, as proposed under S. 22; namely, to "make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied."

S. 22 would also enable land-grant universities eligible for water research support under title I to qualify under title II. Under the present act such universities are specifically excluded under title II.

As a land grant institution, the University of Hawaii has applied for research funds under title I. Should S. 22 become law, the University of Hawaii would also be able to seek title II funds.

As an island State located in the middle of the Pacific, Hawaii has water problems different from those found on the mainland United States but not unique among some Pacific islands. Therefore, the results of water resources research conducted in Hawaii may be applicable to places like American Samoa, Guam, and the trust territory—all of which are under the administrative jurisdiction of the Department of the Interior. Just as research specialists in Hawaii now assist other Pacific islands in such fields as agriculture, education, and public health, so can our research specialists in water resources assist peoples on other Pacific islands. Through cooperative arrangements with the Department of the Interior, Hawaii can serve the national interests in advancing the well-being of the Pacific areas under American jurisdiction.

Not only the University of Hawaii, but also the State government of Hawaii, local water agencies, and qualified institutions, private individuals, and firms would be able to participate in water research as contemplated under title II.

I strongly urge the passage of S. 22.

Sincerely yours,

HIRAM L. FONG.

Senator ANDERSON. Now, Dr. Renne, please go ahead with your presentation.

**STATEMENT OF DR. ROLAND R. RENNE, DIRECTOR, OFFICE OF
WATER RESOURCES RESEARCH; ACCOMPANIED BY EUGENE D.
EATON, ASSOCIATE DIRECTOR, DEPARTMENT OF THE INTERIOR**

Mr. RENNE. Thank you, Mr. Chairman, members of the committee.

We have prepared a statement for the record which I would like to have printed in the hearing report.

Senator ANDERSON. Without objection it is so ordered.

(The statement referred to follows:)

**STATEMENT BY DR. ROLAND R. RENNE, DIRECTOR, OFFICE OF WATER RESOURCES
RESEARCH, DEPARTMENT OF THE INTERIOR**

Mr. Chairman, consistently with the legislative report of the Department of the Interior, my testimony is in support of enactment of S. 22, "to promote a more adequate national program of water research." It is a privilege to support this very worthwhile bill sponsored by the chairman of this subcommittee, Senator Anderson, and cosponsored by 18 other Senators with distinguished records in natural resources affairs.

The bill being considered today complements the provisions of the Water Resources Research Act of 1964 (Public Law 88-379), and provides for engaging in urgently needed water research the full range of scientific and engineering competence that is the purpose of the 1964 act. In fact, amendment of the 1964 act as proposed by S. 22 will restore the act to substantially the form in which it passed the Senate in 1963. The Department of the Interior supports S. 22 now just as it did similar provisions in hearings before this committee in 1963.

The Congress enacted the Water Resources Research Act of 1964, to use words

of the statute itself: "In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population." This congressional purpose stems from recognition of critical present and prospective nationwide problems of water supply in relation to water requirements.

Senate Report No. 29 of the 87th Congress, the report of the Select Committee on National Water Resources, in January 1961 summarized the findings and recommendations derived from 18 months of studies and public hearings. The committee found that in every section of the United States serious water problems exist that will become increasingly serious in the years ahead. The problems are of many different kinds—insufficient quantities of water, unacceptable quality of water, inadequate development of storage and conveyance systems, unresolved competition among various classes of water uses, and inefficient and wasteful water-use practices are among the principal elements of the problems—but the consequence is widening gaps between rapidly mounting water-use requirements and the supplies of water available for use. Water problems, the select committee found, in many sections of the country may constitute a serious hazard to development of the Nation's economy and to the welfare of its people.

A principal means of dealing with these problems is to increase our knowledge of water resources, and thereby to improve our ability to utilize them efficiently and conservatively. The select committee recommended a substantially strengthened and coordinated program of research into ways to increase available supplies, and ways to increase efficiency in the use of water required to produce manufactured goods and services. The committee recommended that, in addition to the in-house research of the Federal agencies, the research competence of universities and others should also be fully utilized, and it recommended provisions to authorize support of such extramural research.

I have very briefly summarized the pertinent background that led to enactment of the Water Resources Research Act of 1964. Some members of this subcommittee were also members of the subcommittee which in the 88th Congress considered the initial authorization legislation, S. 2. A number of the members of the present subcommittee were also members of the Select Committee on National Water Resources in the 86th Congress. It hardly seems necessary, therefore, to take your time to detail the background of the research act. It is, however, pertinent to summarize very briefly the progress that has been made since President Johnson signed the act into law on July 17, 1964.

The program now is in operation. Secretary Udall established the Office of Water Resources Research, reporting directly to the Secretary, to administer the responsibilities assigned to the Department of the Interior. The next step was provision of rules and regulations for administration of the program. These specify who is eligible to participate, how applications are to be made and the information to be supplied therewith, allowable uses of funds granted under the act, and the procedural matters of concern to research administrators. Concurrently, an initial appropriation of funds to implement the program was requested and was provided in the supplemental appropriation act of October 7, 1964.

That initial appropriation provided for a partial funding. The act makes each of the States and Puerto Rico eligible to receive an annual allotment toward the support of a water research center, and, in addition, authorizes appropriation for matching grants for specific water research projects beginning in fiscal year 1965 at \$1 million, and increasing at the rate of \$1 million annually to the \$5 million level at which it continues thereafter. Last October's partial funding provided for allotments to 14 States, plus \$260,000 for matching grants.

By December 5, 1964, the closing date of the competitive period for the initial 14 allotments, requests had been received from institutes established in 43 States and it was necessary to select from them the 14 that could be funded from the supplemental appropriation. With the aid of expert consultants, the selection has been made. However, it was determined also that, consistently with the standards for evaluation that are provided in the act itself, all 43 applicants were qualified to receive an allotment. Subsequently, water resources research institutes have been established in all 50 States and Puerto Rico, and all of them have requested allotments as authorized by the act.

In recognition of the importance of water resources research problems and of the readiness of the institutes in each of the States to move ahead on the research program, the President has requested a supplemental fiscal year 1965 appropriation to fund allotments to all 51 water resources research centers, along with a regular fiscal year 1966 appropriation to continue that support next year.

The Water Resources Research Act of 1964 provided for three forms of assistance to research. The first two of these which I have just discussed are:

(1) The annual allotment to one research center in each State and Puerto Rico, the allotment beginning in fiscal year 1965 at the \$75,000 per State level and increasing by steps to the level of \$100,000 per State by the fourth year, and continuing at that rate thereafter.

(2) Matching grants toward the cost of specific water research projects, beginning in 1965 at the \$1 million level and increasing by \$1 million steps to the \$5 million level at which it continues thereafter.

(3) The third form of assistance is authorized in title II of the act. This is for contracts, matching or other grants, or other arrangements for research by universities other than those at which the research centers are established, research foundations, private firms or individuals, State or Federal agencies, or others competent. This is for water resources research related to the mission of the Department of the Interior. Title II as enacted requires that before title II research projects may be funded, they must lie before the Senate and House Interior and Insular Affairs Committees for 60 days, and not be disapproved by either committee during that period.

At the time that President Johnson approved the act he stated his objection to this procedure for congressional clearance of specific research projects proposed under the title II program, and he requested that Congress delete that requirement. Because of the President's objections, no funding has been requested for title II projects. Enactment of the bill that is now being considered by this subcommittee would remove the feature to which the President has objected, and thus clear the way for proceeding with the title II program.

The full implementation of title II as would be authorized by S. 22 is in the national interest because it would provide for bringing into productive action a wide range of research competence additional to that which is provided through the title I support of State water resources research centers. I have already summarized briefly the findings of the Select Committee on National Water Resources relative to the importance and nationwide occurrence of critical problems whose effective solution depends on additional research.

In 1963, this subcommittee took extensive testimony from a considerable number of authoritative governmental and nongovernmental experts supporting in detail the need for additional water resources research and the potential effectiveness for getting such research performed by utilizing university and other non-Federal research entities to complement the work of the Federal agencies. Although I do not wish to burden the committee with repetition of information with which it is already familiar, it is appropriate to note that 1964 was marked by dramatic demonstrations of the nationwide significance of water resource problems.

From the State of Washington, to California, the West Coast States suffered devastating floods with widespread loss of life, severe property damage, and disruption of transportation and communications. The 1964 floods caused damage comparable to that which might be inflicted on this country by a foreign enemy. Research that will provide means for mitigating future damages of this kind and magnitude unquestionably is needed and justified.

In the same year, in the eastern and midwestern sections of the country, the 1964 drought was equally dramatic evidence of the Nation's water problems. We may perhaps be accustomed to water scarcity in the semiarid Western States, although even there the 1964 drought established new records. As reported by the Interior Department Water Resources Review of December 1, 1964, in New Mexico the combined contents of Elephant Butte and Caballo Reservoirs (which supply the water for the intensively developed Mesilla and El Paso Valley) were 11 percent of the average and 40 percent less than a year ago, ground water levels in the Roswell Basin declined to the lowest level in the 24 years of record, and in Lea County the ground water levels were the lowest in 30 years of record.

But the 1964 drought was not a problem of the Western States alone. The same Interior Department review reported "drought conditions intensified during November in the Upper Delaware River Basin * * * ground water levels continued to decline in Rhode Island, Massachusetts, and southwestern New Hampshire * * * for the fourth consecutive month streamflow of the Susquehanna River at Conklin, N.Y., was the lowest for that month since the records began in 1913 * * * ground water levels in upstate New York continued to decline through November, and in many wells levels were lowest for any month since records began * * * in New Jersey the drought continued through

its 43d month * * *." Equally alarming records were established in a number of other States also.

Implementation of title II will substantially strengthen the research program. This is evidenced by the considerable number of high-quality research projects that have been discussed with us by a wide range of academic and nonacademic people. In fact, even though the title II authorization is not being implemented, 24 research projects have been proposed by 7 different non-land-grant universities from New York and Pennsylvania across the country to Texas and New Mexico. In addition, 12 research projects have been proposed by nonacademic research institutions that likewise are located across the Nation from Pennsylvania to California. This latter group represents a very high order of established research performance. For a considerable period of time, these research institutes have been servicing industry by providing the scientific and engineering basis for new and more efficient industrial production. This kind of research competence won recognition when industry had to meet the demands for nuclear age weapons systems and for space-age exploration. The same competence that rose to those challenges can be applied to provide scientific and engineering know-how for solving the no less important water resources problems. Enactment of S. 22 would permit utilization of that competence.

In addition, the land-grant universities that are eligible for water research support under title I could under S. 22 also qualify under title II. This is highly desirable because in many cases the land-grant universities are especially well equipped to work on problems related to the mission of the Department of the Interior. Enactment of S. 22 would enable this Department to utilize such research competence in developing the scientific basis for new and improved methods of natural resources conservation and development.

The committee may be interested in a few examples of potential title II research projects that have been submitted to us already. The New Mexico Institute of Mining and Technology, a non-land-grant institution of higher education in that State, has outlined research in systems analyses that could provide greatly improved techniques for ground water basin management. The Mellon Institute is interested in research to improve methods for identifying inorganic chemicals in water. New York University at Buffalo, N.Y., has proposed the development of computer methods for studying Lake Erie pollution. The University of Indiana, which, like New York University at Buffalo, is a non-land-grant institution of higher education, has proposed hydrogeologic research to improve understanding of the scientific principles of ground water movement and accumulation. Another example that may be of particular interest to this committee because of its concern with river basin planning is a University of Texas—also a non-land-grant university—proposal for developing analog computer methods for handling water quality data in river basin planning.

I note that the schedule of witnesses provides for testimony by representatives of a number of other research groups that could qualify under title II whenever it is amended along the lines of S. 22. Because those other witnesses will no doubt be furnishing information to the committee I will not cover the discussions that we have had with them about possible research that they might perform. Let me just say in summary that on the basis of a considerable number of discussions and meetings, as well as correspondence, we are confident that there is a very substantial amount of high-quality research which could be performed under the title II program, and that there is every reason to expect that it would produce results valuable in water resources conservation and development.

I appreciate the opportunity of appearing before the subcommittee in support of enactment of S. 22.

Mr. RENNE. I would like very briefly to summarize some of the progress we have made to date, as an entry into the title II discussion. You recall that the appropriations for the water research program were provided for the current year in the October 7, 1964, Supplemental Appropriation Act.

This amounted to enough to fund 14 centers or State institutes. A deadline of December 5 was set for getting in the applications from the States for the first competitive group. By that date 43 States had submitted detailed requests for the organization of their institutes and for funding the allotment under section 100 of the act.

Fourteen out of these forty-three were selected. They were notified of their selection in January, and in the meantime we went over in detail with them specific projects which they plan to undertake under this program.

Mr. Chairman, I have a set of tables which summarizes by 9 major categories the types of projects which have been submitted both for the 14 initial allotments and for the other 37 State research centers, since all 51 have made formal application or request for allotments. I would like to submit those tables to be included in the record.

I think it would be helpful to see the kinds of projects that are being proposed for study.

(The tables referred to follow:)

CATEGORIES OF WATER RESOURCES RESEARCH

1. Nature of water.
2. Water cycle—including precipitation; snow, ice, and permafrost; evaporation and transpiration; streams and lakes; ground water and hydrogeology; oceanic influences; and forecasting.
3. Water and land management—including water movement in soils; water and plants; watershed protection; water-yield improvement; erosion and sedimentation; upstream flood abatement; irrigation; and drainage.
4. Development and control—including water supply; flood control (downstream); hydropower; navigation; urban and industrial water-use problems; recreation; fish and wildlife; estuarine oceanography; coastal engineering.
5. Qualitative aspects—including characterization of wastes; effects of pollution on water uses; interactions of wastes; disposal of waste effluents; surface interactions; effects of development on quality; quality characteristics; and aqueous solutions.
6. Reuse and separation—including saline-water conversion; advanced waste treatment; improved treatment of wastes; treatment of water; and use of water of impaired quality.
7. Economic and institutional aspects—including role of water in growth, economics of development and management; economic analysis of institutions; area appraisals.
8. Engineering systems—including design; materials; and construction, operation, and maintenance.
9. Manpower and research facilities—including education and training; and research facilities.

Preliminary breakdown of research projects proposed by 14 State water resources research centers

Location of center by State	Number of projects proposed by research categories:									
	I	II	III	IV	V	VI	VII	VIII	IX	Total projects
Arkansas.....			1	2						3
Colorado.....		2		2	1					5
Georgia.....	3	6	2	1	4	1	1	2		20
Idaho.....			1				1			2
Illinois.....		1			3			2		6
Michigan.....		2	2	3	1			1		9
Missouri.....		1	1					1		3
Montana.....		1		1						2
New Hampshire.....		1	1		1					3
New Mexico.....			4	2	1					7
New York.....				2		1			1	4
Ohio.....				1	3					4
Utah.....		1			1		1	1	1	5
Washington.....		2	2	2	1		1		1	9
Total.....	3	17	14	16	16	2	4	7	3	82
Percentage.....	3.7	20.7	17.1	19.5	19.5	2.4	4.9	8.5	3.7	100

NOTE.—Broad subject matter headings are those developed and used by the Committee on Water Resources Research of the Federal Council for Science and Technology, Office of Science and Technology.

Preliminary breakdown of research projects proposed by State water resources research centers which did not receive an initial Federal allotment

Location of center by State	Number of projects proposed by research categories									Total projects
	I	II	III	IV	V	VI	VII	VIII	IX	
Alabama.....					4	1		1		6
Alaska ¹										
Arizona ¹										
California ¹										
Connecticut.....		3	2	1	3		1	2		12
Delaware.....		1	2	2	2	1	2			11
Florida ¹										
Hawaii.....		3	3	1				1	1	9
Indiana.....		1	2	1	2					6
Iowa ¹										
Kansas.....		2	2		2					6
Kentucky.....		1	1	1	1		1	1		6
Louisiana.....			2	3	3		6	2		16
Maine.....			1	1	4					6
Maryland ¹										
Massachusetts ¹										
Minnesota.....		4	5		2			2		13
Mississippi.....			2				2			4
Nebraska.....		2	7				4	1		14
Nevada ¹										
New Jersey.....		1		1	1		1	1		5
North Carolina ²		2	8	10	11	1	3	2		37
North Dakota ²	1	1	16	8	8	1	3	4	2	41
Oklahoma.....	1		2	2	4				1	10
Oregon ¹										
Pennsylvania.....		1	1		5		1			8
Puerto Rico ¹										
Rhode Island.....					3		1		1	5
South Carolina.....		4			2		1	1		8
South Dakota ¹										
Tennessee.....			2		2			2	1	7
Texas.....		1	1		3		1			6
Vermont.....		1	1		3					5
Virginia.....		2		2	3			1		8
West Virginia.....		1	1		5			1		8
Wisconsin.....					1		1			2
Wyoming.....									1	1
Total.....	2	31	61	31	74	4	28	22	7	260
Percentage.....	1	12	23	12	28	2	11	8	3	100

¹ List of specific projects to be supported by Federal allotment not available.

² Projects to be initiated first are not specified.

NOTE.—Board subject matter headings are those developed and used by the Committee on Water Resources Research of the Federal Council for Science and Technology, Office of Science and Technology.

Mr. RENNE. The set of three sheets shows the nature of each category and what kind of research is included in that particular category of study. Then the two sheets show the 14 institutes which have been funded and the 37 yet to be funded.

In the supplemental appropriation there were funds provided for matching grants under section 101 of the act, but only \$260,000. We are in the process now of going over the matching grant requests and in the process of selecting those which will utilize the \$260,000.

The other item in the appropriation was for administration, \$155,000. No appropriation, of course, was requested for title II.

In the President's budget was submitted a request for a second fiscal year 1965 supplemental which would fund the remaining 37 State water research centers. As I have said, all of those have submitted their requests. We have gone over their programs carefully and feel that all 37 are worthy and ready for support to undertake the research suggested.

Senator ANDERSON. Doctor, on or off the record, would you care to comment on the fact that Georgia has 20 projects, and no other State has more than 9?

Mr. RENNE. Yes, the projects from Georgia were 20, 16 at Georgia Tech and 4 at the University of Georgia. I think the record is for one of our good Western States which submitted 41, Mr. Chairman, but on an average they range from 5 to 7.

This not only shows a lot of interest—

Senator ANDERSON. Would you like to state which one?

Mr. RENNE. North Dakota.

Senator ANDERSON. I was wondering whether they had an unusually active group or had a man at the school who had a particular interest in water resources research?

Mr. RENNE. In many of the States where the land-grant university is separate from the State university they have, through a memorandum of understanding or agreement, or through a setting up of a joint council or executive committee for the center, worked together in the preparation of the program.

For example, in the State of Washington, the Washington State University at Pullman, where the center is located, and the University of Washington at Seattle, drew up a memorandum of understanding, it was approved by the board of regents, and the research program includes both the University of Washington and Washington State University. They are one of the 14 of the original allotments and they are underway.

So we feel this procedure brings in considerable water research competence of the State.

In the State of Montana, the council or board for the center is made up of seven members, three from the State university, three from the land-grant university and one from the school of mines.

Of course, in many States there are other major institutions that have considerable research competence and that have not as yet been brought into the program. I think this is evidence of not only very real interest but a desire to bring into full play the total research competence in a given State and I think that is one of the very real advantages of having a center in every State, Mr. Chairman.

Senator ANDERSON. I was just trying to find out whether the large number submitted for some States is an indication of greater need or greater enthusiasm?

Mr. RENNE. It is more an indication of their enthusiasm, although in the States with many projects they had not been able to go into many aspects which they would like to go into under our program.

Considerable work has been done with plants and their use of water in growing, but not nearly as much has been done in the management and economics of water use, competitive uses, and further east, in related aspects like acid mine wastes and pollution, flood damage, and that sort of thing.

I think this is evidence not only of interest but also of a desire to work on these problems, which are very troublesome.

Of course, 41 really in a sense shows the scope of interest, but we could not undertake that many all at once in this case.

The budget for fiscal year 1966 provides for funding all of the 51 institutes; that is, the 50 States and Puerto Rico, provided for in the act, with the \$87,500 allotment authorized in the act; and under section 101 for the matching grants it provides for \$1 million rather than the \$2 million authorized in the act.

The administrative expense is listed as \$427,000 for fiscal year 1966. Of course, no funds are requested for title II.

Under the title II of the act we have had a great deal of interest evidenced already. There are witnesses who will testify today who are involved in water research areas which have indicated their interest. They have submitted projects to us. In the prepared statement we break those down, those submitted by non-land-grant universities, those submitted by research firms, foundations, corporations, and the kinds of projects which are being proposed.

Other witnesses will say more about that in their testimony, I am sure.

I would like, Mr. Chairman, to have included in the record, and I have copies here of the President's statement of July 17 in which he explained not only his objection to certain wording of the Water Resources Research Act, Public Law 88-379, but also pointed out some of the very real possibilities of the program under the act.

Senator ANDERSON. I inserted the President's statement in my introductory remarks, Dr. Renne.

Mr. RENNE. Very good, thank you.

Then I would like to put in the record a statement from the Secretary of Interior to the Director of Water Resources Research which explains how he feels the Office of Water Resources Research should be administered if an effective job is to be done.

It especially emphasizes imaginative leadership and along with the President's statement deals with the problem of duplication and coordination.

Along that line we have, Mr. Chairman, worked closely with the Office of Science and Technology, and I would like to include in the record the President's October 24, 1964, memorandum which in accordance with the provisions of the act, named the Office of Science and Technology as the coordinating agency. Our instructions are to work closely with the Science Information Exchange and the Office of Science and Technology in connection with working out a catalog of current research projects. This will assist research workers in seeing what kinds of research are already underway, and the catalog will help us, when projects are submitted, to eliminate duplication and to provide for the most effective program with the funds available.

I have copies of the memorandum of the President to departments. These are brief statements, of course, but I think these documents make the record complete to show the responsibility which has been placed on our office.

Senator ANDERSON. Without objection they will be included at this point.

(The memorandums referred to follow :)

THE WHITE HOUSE,
Washington, October 24, 1964.

Memorandum for :

The Secretary of Defense.
The Secretary of the Interior.
The Secretary of Agriculture.
The Secretary of Commerce.
The Secretary of Health, Education, and Welfare.
The Chairman of the Atomic Energy Commission.
The Director of the National Science Foundation.
The Secretary of the Smithsonian Institution.
The Chairman of the Tennessee Valley Authority.
The Director of the Bureau of the Budget.
The Director of the Office of Science and Technology.

Public Law 88-379, the Water Resources Research Act of 1964, provides that the President clarify agency responsibilities for Federal water resources research and make arrangements for interagency coordination of such research.

In view of the continuing nature of this function, I am asking the Director of the Office of Science and Technology to assist me in this responsibility in close cooperation with the Bureau of the Budget and the departments and independent agencies which are concerned.

The area of water resources research is a particularly difficult one to coordinate because of overlapping statutory missions of numerous agencies. Fortunately, this has been recognized for some time, and substantial progress has already been made. The Office of Science and Technology and the Federal Council for Science and Technology have given special attention to water research for 3 years, and in December 1962 established a Committee on Water Resources Research. The report of that Committee, "Federal Water Resources Research Program for Fiscal Year 1965," which I transmitted to the Congress in March of this year, is evidence of the value of such cooperation.

I shall therefore continue to look to the Director of the Office of Science and Technology for leadership in these matters, and request that he keep me informed, in order that the objectives of these coordination responsibilities are fully realized.

Public Law 88-379 also states that there shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources.

The Science Information Exchange has been making good progress in cataloging such research and shall be the general purpose facility for such cataloging. As required by the act, each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work under way or scheduled by it. Beyond this, it is expected that the Federal agencies will, in turn, make full use of such cataloging center in addition to internal information systems and other means which may be required for good management.

It is recognized that in the enactment of Public Law 88-379 a particularly difficult responsibility falls upon the Secretary of the Interior to so administer the act that it contributes to a comprehensive and coordinated nationwide program of water resources research. He will be required to obtain the continuing advice of all agencies concerned. I expect all those agencies concerned to extend their full cooperation to the Secretary in achieving this objective.

LYNDON B. JOHNSON.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., October 20, 1964.

Memorandum to : Director, Office of Water Resources Research.

From : Secretary of the Interior.

Subject : Administration of the Water Resources Research Act.

In authorizing publication of the proposed rules and regulations that you have recommended, note also must be taken of the policies guiding program administration.

The Water Resources Research Act of 1964 is a major forward step in natural resources conservation and development. It makes possible full engagement of

the Nation's intellectual capabilities in meeting the Nation's water problems. New and improved means of dealing with water problems of local, State, regional, and national levels will result from enlisting the competence of the universities and other research entities. Administration of the program should ensure that these results are achieved.

This new program enlarges the tradition of Federal support for non-Federal agency research that provided for cooperative Federal-State agricultural research. We have the opportunity and the responsibility for an even wider extension of water resources research cooperatively with all who have competence.

There will have to be creative leadership to stimulate research in areas where new knowledge is most needed and to assure high quality in the research undertaken. Building on the experience of other programs of research support, counseling with the technical experts of this Department and of other agencies, and continuing interchange of views with the academic and research communities will assure knowledgeable program administration.

Perceptive administration also should be alert to imaginative new approaches that develop among the research workers themselves. As has been the experience of the cooperative agricultural research program, much of the success of this new program will flow from freedom of research workers to attack problems on their own initiative. Provision of that freedom consonant with the requirements of the act is an important objective of program administration.

Our growing population and our expanding economy require greatly increased water use. The quantity and quality of available water are important not only for utilitarian purposes but also for outdoor recreation, for fish and wildlife, and other deeply valued elements of life.

Resources research can do much in enabling this Nation—and other nations also—to meet use requirements without arresting our growth or sacrificing the natural and social values of our environment.

Basically, this new program joins with long-established programs to meet this purpose.

STEWART L. UDALL.

MR. RENNE. We have now on the press our first catalog, which covers all of the projects currently active which are being financed in part or in whole by the Federal Government. There are more than 1,500 projects included in this catalog, cross referenced different ways for effective use by the Science Information Exchange of the Smithsonian Institution, which has had a great deal of experience in this area. We feel this will be a very valuable catalog.

We expect it to be available within a month. We will see that you receive copies, of course.

A second part of the catalog will be other water resources research not financed in whole or in part by the Federal Government.

We have had a request from some of the river basin agency staffs asking that that we publish a catalog of significant water research being carried on in other countries that might be useful to our own Nation.

These catalogs could be very helpful, not only in preventing unnecessary and unproductive duplication, but also in helping us to see areas which are not being covered, and also, of course, work with others who are working on some of the more significant problems.

MR. CHAIRMAN, that brings us, I think, to title II, which is the purpose of your hearing today on S. 22, which I am sure you all know restores the original wording of the Senate bill which was largely the basis for our present act.

We feel that this proposed amendment would be very valuable in broadening the areas of research competence upon which we can draw. As I have indicated before, a considerable number of projects have been discussed with us by organizations that do not qualify for inclusion in the water research centers, that is, they are not land-grant

universities. Many of them are not State universities. This amendment would broaden the provisions of title II to cover a much larger area of research competence.

The amendment includes the land-grant universities as well as the non-land-grant universities, private research firms and other groups.

We feel that this is highly desirable because if we are to do the most effective possible job of water research we should be in a position to utilize water research competence wherever it may exist.

We cannot do that under the present circumstances.

Some 36 potential title II projects have been submitted to us, 24 of those are from non-land-grant universities. Other projects submitted are from firms such as those that are represented by individuals here today and they will discuss them in some detail with you.

Even though title II has not been implemented, and there have been no funds appropriated for it, we have received these project requests, we have gone over them, evaluated them, but, of course, can do nothing further in funding them.

The 24 research projects that came from non-land-grant universities represent the States of New York and Pennsylvania, across the country to Texas and New Mexico. We have received a proposal from the School of Mines in New Mexico at Socorro, presenting a project for research which we feel has very real interest and merit.

In addition, we have received 12 research projects from nonacademic research institutions that are likewise located across the Nation from Pennsylvania to California.

We feel this group has a great deal of research competence. For example, one of these is the Mellon Institute, which is interested in means of improving the identification of inorganic chemicals in water. We have also received projects from the Illinois Institute of Technology in Chicago, the North Star Research & Development Institute at Minneapolis, and others. Some of these and other projects have been explained in more detail in our prepared statement, Mr. Chairman. We feel they have very real merit.

Senator ANDERSON. Of course, you recognize that the reason many of these projects have not been able to get underway is the result of the present limitations in the law. What is your feeling on those limitations?

Mr. RENNE. Well, consistent with the position of the Department of the Interior and the President, of course, our office favors the amendment to remove the wording on the grounds that it would enable us to operate more efficiently and we would favor that amendment.

Senator ANDERSON. The point is that when a somewhat more drastic form of this same type of amendment was written into the Small Projects Act, President Eisenhower declined to permit the legislation to become effective until this limitation was removed. President Johnson has taken that same position, basically. So the executive branch has maintained a consistent position with respect to such restrictions.

Mr. RENNE. Well, Mr. Chairman, this completes my verbal statement. I would be very happy to answer questions. I have our Associate Director, Mr. E. D. Eaton, with me today and most of you have

known him for a good many years and know of his interest and competence in the field of water research and development.

Senator ANDERSON. What about weather modification? Increasing precipitation is a most fundamental method of increasing water supplies. Do you want to comment on that aspect? The Commerce Committee has not scheduled any hearings on the weather modification bill, S. 23, which I sponsored. Do you feel that weather modification has any part in this program?

Mr. EATON. Mr. Chairman, as this committee is well informed, weather modification is a very promising research area. It is recognized by the Department of the Interior as a very promising opportunity for increasing the usable runoff through a modification of precipitation so that snow will be deposited at high elevations and thereby contribute effectively to usable runoff in the semiarid areas.

This committee has had a major impact on that program by encouraging the Department to undertake research and it has assisted in securing funds for that research. As a consequence of this there is now quite an active program of weather modification being supported largely through the appropriations to the Bureau of Reclamation supplementing the programs of the National Science Foundation and the Weather Bureau.

This has utilized a good deal of the available competence in that field at this time. We feel that the Research Act would enable us also to participate in supporting that sort of research should that become desirable.

At the present time, it appears that weather modification research proposals are submitted to the National Science Foundation, the Weather Bureau, and the Bureau of Reclamation, rather than to the Office of Water Resources Research. A number of good research men are interested in this work, according to our information.

Does that answer your question, sir?

Senator ANDERSON. Yes. With the exception that the Committee on Commerce has not taken any action on Senate bill 23, which deals with this very problem. Of course, there was a newspaper story, the authenticity of which I do not guarantee, to the effect that certain areas might be retaining for themselves certain water supplies through weather modification. It is a story that has interested us for many years.

You can increase the number and density of rain clouds, and also take action which will affect where the moisture might fall. Weather modification is very important in any consideration of water supplies in many areas.

It is my hope that it might be possible for this agency, in its consideration of water resources, to look into the development of additional water supplies through weather modification.

Mr. EATON. The terms of the water research legislation would authorize our support of that sort of project. Should meritorious projects be submitted to us and if the Bureau of Reclamation or the National Science Foundation's established programs were not able to support such research, we would be able to consider it.

I certainly agree with you, sir, that this is one of the very promising and very important fields that requires additional research emphasis. Senate bill 23, of course, would establish that on a long-term basis.

Senator ANDERSON. If the flow of the Colorado River reaches 13 million acre-feet somebody might become very interested.

Mr. EATON. Facetiously, Mr. Chairman, I have heard it said there are really many problems of the Colorado River drainage basin that would be solved by an additional 5 million acre-feet of runoff per year.

Senator ANDERSON. I think that might be true; I think also it is one of the problems we might be able to solve.

Senator MOSS?

Senator MOSS. Thank you. I just have one question.

You mentioned in your remarks, Dr. Renne, that research is being done on acid mine wastes, or waste water. Can you tell me where particularly that is being done? Is it being done only in the East or out West also?

Mr. RENNE. Yes, sir; the three States in which this problem is serious are Ohio, West Virginia, and Pennsylvania. All three of these States, through their water research centers, submitted projects that dealt with some aspect of acid mine wastes. Ohio is one of the initial 14 for allotment. They emphasized in their proposals the study of means by which acid mine waste problems in polluting water could be solved. It sounded so much like a project that is already underway by the U.S. Geological Survey that we had them check very closely.

And the U.S. Geological Survey advised that the proposal of Ohio is along different lines, particularly the ecological and the biological aspects of the effects of this waste on the growth of certain plantlife in streams which, in turn, of course, affect not only the fish but the quality of the water itself.

The Public Health Service is very much interested in this type of project. They indicated also that this project was not a duplication of theirs and so Ohio is going forward with that particular project. Pennsylvania submitted projects along this line and so did West Virginia. There are other States that are concerned with it, but I think these three are most concerned with it.

Senator MOSS. Coal mines primarily are the subject of such studies?

Mr. RENNE. Yes. In the process of mining the coal you release certain other minerals so that the problem becomes quite complex.

Senator MOSS. The same problem would apply, perhaps, to other metal mines and therefore we might expect to find interest and concern in the Rocky Mountain area, too.

Mr. RENNE. Very definitely, the Rocky Mountain Range. Yes, sir.

Senator MOSS. Thank you.

Senator ANDERSON. Senator Kuchel?

Senator KUCHEL. Only this. I am a coauthor of this legislation and I shall support it, because I very much believe that out of scientific research and study, the national interest will be served presumably by making more feasible proposals to assist all parts of this Nation in solving specific problems in the field of water which face them—too much, too little, and so forth—in your categories of water resources research which you have enumerated.

I take it we are all agreed the purpose of the law which would not be affected by this bill is for research with respect to any problem that touches that subject?

Mr. RENNE. That touches either the quantity or quality, Senator.

Senator KUCHEL. For example, were the benefits of nuclear power to be involved in any study, that would not preclude your authority from granting the type of research contracts you contemplate herein, would it? It is wide open?

Mr. RENNE. I think anything which affects the quantity of water or the quality of water is a pretty broad range.

Senator KUCHEL. Or the movement of water from one area to another, for example, Doctor?

Mr. RENNE. Yes.

Senator KUCHEL. Because we are also interested in the problem of cost.

Mr. RENNE. Yes.

Senator KUCHEL. And if by utilization of this new-found source or power, water could be transported from one area to another more economically and thus more feasibly, and studies were available to you in which the use of nuclear power would be a part, that would be within the purview of this law; would it not?

Mr. RENNE. Yes, sir; and we have. I recall one proposed research which involves a study of the cost factors of lifting water to get it on to certain lands that are not now reachable because of the cost of lifting the water for irrigation. A lower cost of power, which might be developed through nuclear processes, would, of course, bring that project into very definite range of feasibility.

Senator KUCHEL. I have no more questions, Mr. Chairman.

Senator ANDERSON. Senator Burdick.

Senator BURDICK. No questions.

Senator ANDERSON. Senator Allott.

Senator ALLOTT. I have just one question, Doctor.

My only concern about this entire program has been one of duplicated effort. I understand you come from Montana—

Mr. RENNE. Yes, sir.

Senator ALLOTT. As you know, there is a great deal of water research that has gone on in the West, mostly in our higher educational institutions.

Mr. RENNE. That is correct.

Senator ALLOTT. The matter of water research is not one that has just recently been given attention in the West, it has been going on for a period of, in some instances, 75 years or more.

In looking over your breakdown, I see that you have research going on in the same categories at as many as 7, 8, 9, 10 different places.

Now, my only thought is this, that a great deal of care has to be exercised to keep this from becoming a duplicative process. We cannot afford wasteful duplication—we have been doing too much of it.

You mentioned that the Office of Science and Technology was going to supervise this matter. Who has charge of that office now?

Mr. RENNE. Dr. Donald Hornig is the Director of the Office of Science and Technology.

Senator ALLOTT. I have not had a chance to meet him. He has not come before our appropriations meeting yet, and, of course, he is inexperienced at appearing before congressional committees. How many people in the Office of Science and Technology—which has a comparatively small staff—are devoted to the active supervision of the research programs?

Mr. RENNE. I am going to ask Mr. Eaton to answer that, because OST has a Committee on Water Resources Research. Mr. Eaton represents our Department of Interior along with Mr. Hendricks, the alternate on that Committee. It is made up of representatives from all the major departments of the Government that have any interest and activity in water research. We feel this is a medium through which a great deal of information necessary to keep duplication to a minimum, Mr. Senator, is provided, and I would like Mr. Eaton, since he represents our Department on that overall coordinating committee of water research, to answer that.

Senator ALLOTT. Let us hear from him. I would like an answer to my question, if I can get it.

Mr. EATON. Senator Allott, the Office of Science and Technology, which is a unit of the Executive Office of the President, under the directorship of Dr. Donald Hornig, has one full-time professional staff man who devotes substantially all of his time to water research in the Office of Science and Technology. He functions as a staff man, assisting the Director of the Office of Science and Technology, and also as chairman of the interdepartmental committee on water resources research, which is composed of representatives of all of the executive departments and independent agencies.

Senator ALLOTT. Who is the man?

Mr. EATON. This is Mr. Ray Linslay, Prof. Ray Linslay, who is on leave from the College of Engineering at Stanford University.

Senator ALLOTT. What is his background in water?

Mr. EATON. He is a civil engineer of very high professional standing as an engineering hydrologist, and author of one of the most widely used text on engineering hydrology. He has many distinguished positions in professional societies. If you would like, I could supply for the committee a brief statement of—

Senator ALLOTT. I will get that from the Director.

Out of a total staff of 133, then, in the Office of Science and Technology, I am not sure I understand your figures—do you know how many there are there?

Mr. EATON. I do not know the number.

Senator ALLOTT. There is, however, one man who is assigned to the area of water. I am asking this question because I am sure that it ties directly into the limitation that Congress put in title II last year, which indicated a concern we would move so fast in this area that the research grants and assistance would be excessive and, therefore, duplicative.

To what extent are these actually reviewed in the water research office, to be sure that there is not a duplication? It would seem that in some of these categories Dr. Renne has put in his tabulation there is duplication—this is not in the record, is it, Mr. Chairman?

Senator ANDERSON. Yes; it is.

Senator ALLOTT. That there is such a wealth of knowledge that to rework and turn over again and again a lot of these areas is an unjustifiable duplication. This is what I personally am concerned with. I am not concerned with the need for the solution to these problems, because I am convinced of the need. Since we in the West, particularly the 11 Western States, have worked on many of these problems, there is already a wealth of research information.

I do not want to keep on turning over the same ground, and I want to be sure that we are not turning over the same ground.

Mr. RENNE. I agree with you thoroughly, Senator. I will explain just very briefly that these nine categories have been developed by the Office of Science and Technology. They include within each category many subsections so that grouping them into these nine general categories would not necessarily indicate that because several research projects are in category 4 or category 5 that it is necessarily duplication. But I will explain briefly how we try to review these projects.

We have a very small staff. There are six of us on the professional staff in the Office at the present time. Each of us goes over the project carefully, the proposal for research, and then we determine which agencies of the Government, which are in a closely related field, would be best able to give us an appraisal of whether this duplicates any on-going research.

Senator ALLOTT. Does the member of the Office of Science and Technology exercise an effective veto power over the actions of your Department under this water resources program?

Mr. RENNE. No. I think it is more the providing of information upon which scientists can appraise whether they are duplicating and the kind of duplication.

Now, of course, some projects sound very similar, and yet different emphases are being undertaken, and this is not actually unproductive duplication.

Senator ALLOTT. I simply wanted to express for the record my only real concern about this whole area in which we are just getting started. I believe the chairman has some more questions he wants to ask, so I will yield at this point.

Mr. RENNE. May I add one point, Senator?

Senator ALLOTT. Yes.

Mr. RENNE. We do rely heavily on panels of consultants made up of individuals who are pretty well known, and expert in their particular fields. We rely upon them when projects are referred to them to tell us whether in their knowledge there are other projects being undertaken which would be duplicative.

We feel that these individuals are the most likely to know whether there are other projects that are on-going that would be duplicative, because we have a small staff, and we are especially anxious in consulting with other members of the Federal Government, of departments as well as these experts and consultants, to keep duplication to an absolute minimum.

We feel that is one of the major objectives of this Office, Mr. Chairman, to coordinate work in water resources research and to keep duplication to an absolute minimum.

Senator ANDERSON. Dr. Renne, I am very much interested in the questions which Senator Allott asked. There comes to mind my own experience with the Agricultural Act in 1947, in which the Government was spending huge sums of money for agricultural research without knowing what was going on in agricultural research. It took us, as you may recall, weeks and months to even make a catalog of all these and put them on punchcards and check them to find out the number of places where absolute duplication was taking place.

I will cite one example. Many schools in the West were interested in the question of how the irrigated cotton took dye compared to how Rain Belt cotton took dye. States side by side were doing the same work in the same fashion at somewhat duplicative costs.

I think that is what Senator Allott is trying to avoid. You may recall that in the initial version of the bill that became the law, we had a provision for a catalog of projects; it was stricken out because officials who would administer the act testified that such catalogs would be prepared in any event. I am glad to see that you are doing it.

I would like to have you clarify what you are finding out in these catalogs. Do they show the duplication? Can we assume that, all over the United States, all water research work is done without duplication of somebody else's work, or are the same things happening frequently?

For example, in flood control, diking is often necessary. Some people found out that, strangely, atomic energy programs might have some part in such programs. Isotopes were placed on the banks. As a result the places of origin of the silt were able to be ascertained. Therefore, by placing dams in certain places it is possible to stop reservoirs from silting up so rapidly.

A development such as this is potentially of very great value. But we must have some means of channeling dollars so the work they do will not be duplicated. The situation outlined by Senator Allott could get out of hand. I do not know who the man is in the Science and Technology Division, but he has his work cut out for him if he is going to keep track of all the water resources research projects in the United States. I think perhaps we ought to have more than one man on it.

But I interrupted you, Senator Allott; I am sorry.

Senator ALLOTT. I appreciate the chairman's remarks. I have concluded my questions. Thank you, Mr. Chairman, very much.

Senator ANDERSON. Senator Jordan.

Senator JORDAN. Mr. Chairman, I think we all recognize the need for a strong program of water research. I want to identify myself with the remarks of Senator Allott and the chairman here. My great concern over the possibility of just endless duplications of the many research projects—I am not going to belabor the point, because Senator Allott covered it very well.

I would only ask to make this request, Mr. Chairman, that Dr. Renne or the staff provide for the record a list of the projects that have been turned down because they duplicate other projects.

Mr. RENNE. Do you mean our office, Mr. Senator?

Senator JORDAN. Yes; whoever does the screening of these research projects.

Senator ANDERSON. I don't believe he cares whether your office did it or the Office of Science and Technology did it, as long as somebody has turned down something because of duplication.

Senator JORDAN. And the list of projects turned down by someone because they duplicate other research projects.

Mr. RENNE. Yes. We have already begun going over submissions by the States and have found some duplication which we have eliminated.

Senator JORDAN. I want a list of those projects turned down by someone because they are duplicative.

Mr. RENNE. We will get that for you, Senator, and have it for the record.

Senator ANDERSON. One of the reasons that caused President Johnson to hesitate a long time before signing the water resources bill was the provision requiring these projects to be submitted to the Senate and the House of Representatives. If you do not want us to have such a requirement in the law, you should make it possible for us to be satisfied that these dollars are being used effectively. I am sure if you are going to expect additional appropriations in future years, it has to be done on the basis that Congress is satisfied this work is fulfilling a need.

Mr. RENNE. With your permission, Mr. Chairman, we will prepare a brief statement for the record.

Senator ANDERSON. Yes.

Senator JORDAN. That is all, Mr. Chairman.

Senator ANDERSON. Thank you very much, Dr. Renne.

Mr. Eaton, we are also glad to have you back with us.

(The information requested is as follows:)

ACTION ON SPECIFIC RESEARCH PROJECTS WHICH THE OFFICE OF WATER RESOURCES
HAS QUESTIONED FOR POSSIBLE DUPLICATION

1. New Hampshire Water Resources Research Center: The proposed project, "Water Production as a Forest Land Use," was questioned. The Office of Water Resources Research recommended consultation with the U.S. Forest Service, the Geological Survey, and other agencies. As yet no reply has been received, hence approval has been withheld.

2. University of Ohio Water Resources Center: With respect to three proposed acid mine water research projects, the Office of Water Resources Research requested further information as to their relation to other current research on the subject, especially the activities of the U.S. Bureau of Mines, the Geological Survey, the Bureau of Sport Fisheries and Wildlife, and the Public Health Service. This information was requested with particular regard to provision for coordination and avoidance of unproductive duplication. The center has responded that further searches have revealed no duplication of effort previously reported or currently underway and has provided detailed information on these searches. Proposals have been approved.

3. Utah State University Center for Water Resources Research: The Office of Water Resources pointed out that the project, "Water Quality Factors," might be closely related to research of the Public Health Service and of the U.S. Geological Survey. The Office of Water Resources Research requested that the Utah center confirm that their project has taken that into consideration so as to avoid undesirable duplication. The center responded stating that this project had been discussed in detail and does not duplicate work underway or planned by others. This project has been approved by the Office of Water Resources Research.

4. Kentucky Water Resources Institute: The Office of Water Resources Research pointed out that the proposal, "Collection and Evaluation of Basic Geologic, Hydrologic, and Climatologic Data," appears to be partially duplicative of activities of the U.S. Geological Survey. The institute was asked to reexamine it and advise of steps taken to eliminate any duplication that may be involved. No reply has been received as yet, and approval is being withheld accordingly.

5. Virginia Water Resources Research Institute: With respect to the project proposal, "Geomorphology of Beach Processes," the Office of Water Resources Research requested a statement as to whether the institute has consulted the Corps of Engineers about the research they are conducting on beach erosion and similar problems. We stated that this project is peripheral to the primary emphasis placed by the Water Resources Research Act on water supply and quality and asked that the institute consider substituting another project for this one. No reply has been received as yet and approval is being withheld accordingly.

6. Virginia Water Resources Research Institute: The project, "Mass Transport in Ionic Systems," was questioned as apparent duplication with Federal agencies' programs, in this case Office of Saline Water. No reply has been received as yet, and approval of this project is being withheld accordingly.

7. Virginia Water Resources Research Institute: The project, "Treatment of Industrial Wastes," was questioned as being apparent duplication of the Federal agencies' program, in this case the Public Health Service. The Virginia institute was asked to advise the steps taken to assure avoidance of duplicative research. No reply has been received as yet, and approval is being withheld accordingly.

8. Arkansas Water Resources Research Center: In the case of proposed project entitled "Quantitative Analysis of Streamflow-Rate Extremes" the question was raised by the Office of Water Resources Research as to whether the type of information developed cannot be readily secured through existing and evaluation of this proposal was requested of the center by the Office of Water Resources Research. The center made a further evaluation of this proposal and consulted with several people of the U.S. Geological Survey and the State of Arkansas. They concluded that the proposed statistical analysis of the streamflow data will provide much useful information that would not otherwise be available. The project was expanded to provide more information than was originally planned. The Office of Water Resources Research has accepted the explanation provided by the center and has approved this proposal.

9. Arkansas Water Resources Research Center: In the case of the proposed project, "Environmental Changes Produced by Cold-Water Outlets From Three Arkansas Reservoirs," confirmation was requested that this project had been coordinated with related activities of the Bureau of Sport Fisheries and Wildlife. Evidence has been received that this coordination has been effected and the proposal has been approved.

10. Auburn University Water Resources Research Institute: With respect to the project, "Oxidation of Organic Pesticides," further information was requested of the measures the institute will employ to avoid unproductive duplication of research by others including such Federal agencies as the Agricultural Research Service, the Public Health Service, and the Bureau of Sport Fisheries and Wildlife. No reply has as yet been received, and approval of this project is being withheld accordingly.

Twenty-three additional proposals from institutes for initial grants under Public Law 88-379 are now being evaluated by the Office of Water Resources Research. Other proposals where suspected duplication is involved may be uncovered and be called to the attention of the institutes for clarification prior to being approved. The Office of Water Resources Research assures avoidance of undesirable duplication by research supported under the Water Resources Research Act of 1964 by the following procedures:

(a) The regulations for administration of the program require that recipients of research support funds must make inquiry of the Science Information Exchange to determine what research is planned or in progress in the particular field of study to be undertaken, and that the projects proposed for support under the act do not duplicate established water research programs.

(b) Applicants must submit descriptions of their proposed research projects on the format of the Science Information Exchange to facilitate the appraisal made by the Office of Water Resources Research as further assurance of nonduplication.

(c) Requests for supporting funds and specific research projects proposals are reviewed by competent specialists from Federal and State agencies and from university staffs. Their review will specifically cover the question of duplication in addition to other questions.

The Office of Water Resources Research is taking an additional important action to assure avoidance of undesirable duplication of research supported under the act. Section 304 of the act states that there shall be established in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. The President has designated the Science Information Exchange of the Smithsonian Institution as the general purpose faculty for such cataloging.

The Science Information Exchange serves as a clearinghouse for information on current scientific research actually in progress. Government agencies and many non-Government agencies with major research programs actively cooperate by furnishing the exchange with timely information on their current research programs and projects. Non-Government agencies include private foundations

and fund-raising agencies, universities, industry, and individual investigators who wish to register their research.

As recognized by the act substantial improvement in water resources research activities can result from the general availability to research workers of current information on projected and on-going projects.

Accordingly a water resources research catalog, now in the hand of the printer, has been prepared listing all water research projects now being performed under U.S. Government sponsorship. This catalog is needed by the Office of Water Resources Research as one of the tools for administration of the program so as to avoid undesirable duplication of research. It also enables applicants for support under the program to avoid such undesirable duplication by being knowledgeable about what water resources research is being done, by whom, how, and where it is being done. Probably of equal value, the catalog enables the entire research community to be knowledgeable of the entire range of current scientific and engineering research related to water resources, their conservation, development, and utilization.

Senator ANDERSON. Without objection, we will put in the record a statement by William E. Welsh, executive director of the National Reclamation Association.

(The statement referred to follows:)

STATEMENT OF WILLIAM E. WELSH, EXECUTIVE DIRECTOR NATIONAL RECLAMATION ASSOCIATION

My name is William E. Welsh. I am executive director of the National Reclamation Association.

The National Reclamation Association over a long period of years has been intensely interested in all problems relating to soil and water research. We have had a special committee of our association working on this problem year after year since 1951.

We are fully aware of the increasing demand upon our available water supply and recognize, therefore, the need for accelerating our research program. We wish to congratulate those who have introduced and sponsored the bill, S. 22, which is now before you and are happy indeed to join in supporting this legislation.

In 1961 the National Reclamation Association joined with the National Association of Soil and Water Conservation Districts in sponsoring a national water research symposium which was held in Washington, D.C. Speakers at this symposium included some of our nationally known and best informed men on this subject. We believe this symposium aided materially in bringing to the attention of the country as a whole the necessity for accelerating our water research program. The program of this symposium, including all of the excellent speeches delivered at the symposium, was published as Senate Document 35 in June 1961.

Our soil and water research committee, in its report submitted at the Palm Springs convention last November, took a strong position in endorsing the accelerated program which the bill now before this committee, S. 22, would authorize. The following is a quote from our committee report:

"Title II, as originally contained in the bill S. 2, more realistically covered the research needs and provided for the fulfillment through modest, but adequate, appropriations, but had been completely removed by the House committee. Steps should be taken to either modify the present legislation or to reinstate the original concepts of title II of Senate bill 2."

Also, our resolution on soil and water research, which was adopted at the Palm Springs convention, strongly endorsed and urged strengthening of our water research program in the manner which S. 22 would provide. The following is our NRA Resolution No. 17 as adopted at the Palm Springs convention in November 1964:

"Whereas this association has for many years urged an acceleration in programs of soil and water research; and

"Whereas the amount of Federal funds spent on soil and water research of value to the reclamation States is inadequate to meet their increasing demands and should be materially increased: Now, therefore, be it

Resolved by the National Reclamation Association, That those provisions of Senate Document 59 relating to the needs of the reclamation States be implemented and the program be accelerated so that important major research pro-

grams of value to the reclamation States be accomplished at an early date; and be it further

"Resolved, That Public Law 88-379 (Senate bill 2) be amended by including in title II thereof the original provisions of said title contained in S. 2 as introduced; and be it further

"Resolved, That research relating to the control of noxious weeds, to reduce injury to agricultural crops, be materially increased; and be it further

"Resolved, That copies of this resolution be forwarded to the Appropriations Committees of the Congress, the Budget Bureau, and the Secretaries of Agriculture and the Interior."

We do, therefore, strongly support the bill, S. 22, which is now before your committee.

We appreciate very much not only the opportunity of presenting this statement but also the forward-looking progressive attitude which this committee has taken with respect to the important problem of water research.

Senator ANDERSON. Because Senator Allott is compelled to return to his work on another committee, I am going to ask Dr. W. E. Morgan, of Colorado State University, and chairman of the Water Resources Committee of the National Association of State Universities and Land-Grant Colleges, to testify at this time.

Senator ALLOTT. Mr. Chairman, I am very happy to present to the committee a man who I am sure has appeared before this committee on other occasions, and before other committees of Congress. He is the distinguished president of our Colorado State University, and we are very proud of him. We are particularly proud of the growth and advancement that the university has made under Dr. Morgan.

We are very happy to have you with us, Doctor.

Senator ANDERSON. Dr. Morgan, is Dr. Frey here with you?

Dr. MORGAN. Yes, sir.

Senator ANDERSON. As long as Senator Allott said what he did say, I want to add that you can hardly imagine how reassuring it has been during the progress on this water research legislation and other bills, Dr. Morgan, to have your constant help and support, and your very good judgment. It has been a tremendously wonderful experience for many of us. We have had to rely on long-distance telephoning to you, but your comments have been very helpful. Your presentations have likewise been very fine and useful to us. We are glad you handled this matter for the association of the land-grant schools.

STATEMENT OF DR. WILLIAM E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY; CHAIRMAN, WATER RESOURCES COMMITTEE, AMERICAN ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES; ACCOMPANIED BY DR. JOHN FREY, OF PENNSYLVANIA STATE UNIVERSITY

Dr. MORGAN. Senator, I thank you very much for those nice words. I appreciate the nice words of my Senator from Colorado also.

I have a statement for presentation to you. I thought I was coming on at 3 o'clock this afternoon, so I am busy rearranging things here, Senator.

My formal statement is only two and a half pages long. It was designed in expectation that questions would be asked to amplify it, and, therefore, I propose to read the entire statement. It will take less than 5 minutes.

My name is William E. Morgan. I am president of Colorado State University and am here in my capacity as chairman of the Water Re-

sources Committee of the National Association of State Universities and Land-Grant Colleges. I appreciate the opportunity to appear before this committee to express the association's interest in S. 22.

The National Association of State Universities and Land-Grant Colleges, in whose behalf this testimony is presented, consists of 97 State and land-grant universities and colleges located in each of the States and Puerto Rico. Member institutions grant more than one-fourth of all baccalaureate degrees and substantially more than half of all doctoral degrees in the United States. My appearance here today for this specific purpose is authorized by the association in a resolution adopted at its annual meeting November 10, 1964.

Last year when S. 2 was before you, I appeared as head of a panel of five witnesses from member institutions of our association for detailed discussion of the reasons for our support of that bill. Since the purpose of S. 22 is to return to the original concept of S. 2, I shall not burden you with repetition of the testimony presented a year ago, although I would like to state for the record that the testimony presented at that time is equally applicable today.

Instead of a panel of five witnesses today, we have present one other person from our association, Dr. John P. Frey, of Pennsylvania State University, whom you are asked to hear, and I should like to file with you a statement from another association member, Cornell University, of New York, signed by Dean Charles E. Palm, of the College of Agriculture, and Dr. Leonard B. Dworsky, Director of the Water Resources Center at Cornell University.

Senator ANDERSON. Without objection, that statement will be added to the record.

(The statement referred to follows:)

STATEMENT OF CORNELL UNIVERSITY, ITHACA, N.Y.

Cornell University's current centennial celebration has offered the university an opportunity to review its basic purpose and to rededicate itself to the future well-being of man and society. Cornell's original goals of offering any intellectually qualified person instruction in any subject and ignoring distinctions based on religion, sex, and color; of liberalization of the arts curriculum, promotion of research and advanced training in agriculture and engineering have been met.

Today, the rededication to these goals and their extension is not merely the task of the university. In the field of research, for example, it is a task also of government. That this view, too, is held by the Congress is clear in the research support to universities that it has provided. The Water Resources Research Act of 1964 is an outstanding example.

As we view the future, few things are certain. There are, however, a number of facts that seem reasonably clear. The Nation's population will double in a little more than three decades; more than 90 percent of our people will be living in urban centers within two decades; industry will double its productivity in about the same time; agriculture will have to maintain and improve its high rate of efficient production; and leisure time and opportunities for a better life will demand more recreational activities.

It is also clear that we will achieve these results effectively, at reasonable cost and without damaging limitations only if we develop the knowledge needed to control and manage our water resources.

The importance and value of S. 22 rests in the flexibility it provides the Nation in meeting a wide range of water issues and in the complementary nature of its provisions with other parts of the Water Resources Research Act of 1964 (Public Law 88-379).

Modern American universities, such as Cornell, provide the basic facilities for the production of qualified manpower to plan, develop, and manage the Nation's water resources, and can contribute greatly to the development of needed new knowledge through research.

In this national endeavor we must not—we cannot afford to—overlook any part of our society that can make a contribution to this important problem. Thus, the funds and the variety of methods as grants, contracts, matching, or other arrangements should be viewed as parts of an expanded armament to attack water problems. The ability to use this armament in connection with any part of our national composition—education institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies—provides the best assurance that we will be able to use our best talents wherever they may be found.

We are pleased to report to this committee that the Water Resources Research Act is helping Cornell to step up significantly its contribution to water resources research and the related training of scientists and engineers. As one of the universities selected to receive early support from the supplemental appropriation made available during the last session of Congress, we look forward to a continuation of the excellent cooperation we have received from the Office of Water Resources Research in the Department of the Interior and to the development of new and practical information to help us meet both our State and the Nation's needs.

Cornell University is pleased to join with the universities represented on this panel, under the outstanding leadership of President William Morgan, of Colorado State University, in urging favorable action on S. 22.

CHARLES E. PALM,
Dean, College of Agriculture.

LEONARD B. DWORSKY,
Director, Water Resources Center.

STATEMENT OF DR. WILLIAM E. MORGAN—Resumed

Dr. MORGAN. Further, I wish to emphasize our association's support of the position taken with respect to this bill by witnesses representing other educational institutions and research organizations which are not members of the association I represent. We work closely with these other organizations in fruitful cooperation in the laboratory, in research planning, and in the classroom.

And now, I shall limit my remarks to a brief discussion of S. 2 as conceived in its original text.

Title I funds provided a base of fiscal support which, while relatively modern in size, had the value of continuity without threat of diminution. Thus the research administrator could not only plan with confidence for an on-going program of minimal size but could recruit his personnel with honest assurance that the job was not subject to the hazard of early termination. One must understand the workings of the typical academic mind to appreciate the enormous value of this factor of assured funding.

Title I also provided for selective funding of additional "peaks" of work on special or limited-term projects that would be superimposed on the base just discussed.

Title II funding, on the other hand, permitted what the military theorists would call "concentration of force" at the same time it promoted the development of a balanced research effort under the condition that exists in our country, a condition of wide diversity and broad dispersion of our national research talent.

The term "center of excellence" has been used, and doubtless abused, in free wheeling discussion of the broad subject of water resources research, but it serves my purpose well at this point, since title II funding would encourage the development of such centers. In its broadest context, the water problem in North America deserves the attention

of research talent wherever it exists, and the mechanism of title II enables the research administrator to seek it out and induce it to work.

Passage of S. 22 would facilitate and promote this end. On behalf of our association, I urge you to give favorable consideration to the bill.

Senator ANDERSON. Thank you, Doctor. Your suggestion to us is that there are private foundations and private institutions and things of that nature that ought to be utilized occasionally.

Dr. MORGAN. Yes, sir, the capabilities of these organizations, the personnel in these organizations, are available for the effort in water resources research. The need is for a means of triggering the effort, and title II funding as originally conceived provided that mechanism.

Senator ANDERSON. I do not quite know how it is lawyers go about qualifying a man as an expert witness, but if you are not an expert witness in this field, I do not know one who would be.

Do you feel there are problems in connection with water resources research that can be profitably handled by institutions, agencies, and individuals in addition to the land-grant colleges for which provision is made in the existing law?

Dr. MORGAN. I do, sir, for the reason that, as proud as I am of the institutions I represent, the public universities do not have a corner on all the talent in the many, many disciplines that can contribute to a broad program of water research.

Senator ANDERSON. I think that is a fine statement, and I appreciate it very much. You have been before us a great many times, and have given this a lot of thought.

Senator Allott?

Senator ALLOTT. Doctor, you mentioned one thing, and I note that the act still contains a clause which states: "deemed desirable and not otherwise being studied."

I am sure you agree with the point we had under discussion, which is to make every effort to see that we are not duplicating our research efforts and draining off available talent into duplicative work.

Dr. MORGAN. Senator Allott, I agree with this position completely. As one responsible for research administration, although a step or two removed on the the campus, I would like to assure you that we who have that responsibility are equally concerned to see that we do not have unwarranted duplication inside our own organization's efforts.

Duplication is a difficult thing to defend, and it becomes more difficult to defend when the pressure for use of our limited supply of research talent becomes greater as these problems crowd in on us.

I would, however, like to comment a little further on the subject of duplication, having been concerned with the problem of avoiding it for so many years in my job.

There are some things that appear to be duplicative on the surface, which, after further study and examination, are not nearly so duplicative.

Let me see if I can put it in these terms, although I am oversimplifying the problem in doing so. The more basic or fundamental the research project, the less justification there is for duplication of the effort at some other place for the reason that findings that come from so-called basic research are rather universal in their application, and once this answer has been derived in Pennsylvania or at the

University of Wisconsin, it is equally applicable in New Mexico or California, and so on.

So, this is what I mean by the statement that the more basic the inquiry, the less reason there is for duplication some place else.

A great deal of our research is applied in nature, and so I would say the converse of the previous statement is that the more the research project is one of application to a particular problem in a particular area, the less reason there may be to criticize it as being duplicative of something else.

Let me see if I can give you an example. We are very interested in the mountain area of Colorado in means of land treatment—mechanical and otherwise—to increase the water yield of the snow and other precipitation that falls on that area.

Now, the Great Smokies, are another mountain watershed, and I am sure there is interest in increasing the water yield from the precipitation there. Projects to discover how one may treat mountain land to increase water yield in these two areas might appear duplicative in that they are aimed at the same objective. But the results obtained in one area may be entirely different in another. The object of the exercise, however, is to increase the water yield at both places.

Ground-water management in the high plains and mountain regions or in the closed basin regions of the State where I live, I am sure, present different problems to the researcher than ground-water management in Missouri or in one of the Mississippi Valley States.

You could go on and on. What I am trying to say is that when research clearly is applied research—and bear in mind that one of the objectives of S. 2 was to permit States with all their wide diversity of conditions to work on some problems that are close to home and bothering them—there undoubtedly will be a lot of apparent duplication, and after further examination it may, of course, be real duplication. But I urge the review agency to look underneath each of these projects very carefully before assessing the degree of duplication.

Senator ALLORT. I think I might even supply you with another good example. In Colorado, we have been struggling for many years—as you know, this goes back 30 years—in attempting to write a ground-water law. Actually, in my own mind a great many of the reasons for failing to do so lie in the lack of knowledge, as much as anything else—knowledge about our water, its direction, its scope, all of the other technical factors which make it impossible to write, or have made it impossible to write an intelligible bill up to this time. What would be secured from research in this area of Colorado, of course, may not be applicable to Montana, or Wyoming, or any other place.

There is another aspect of this that I would like to mention, since no one has mentioned it here this morning, Mr. Chairman. I look at the chairman's adjoining State of New Mexico and I see the fantastic growth of the Albuquerque area and the Santa Fe area, and I am sure that he can envision in a few years a megalopolis extending all the way from Santa Fe to Albuquerque. We in Colorado, who are looking ahead, can envision a megalopolis, from the Fort Collins-Greeley area south to Pueblo. This kind of development poses a problem which, I believe, is going to be the greatest problem of all.

It comes to a matter of not just recognizing and conserving water. It goes far beyond merely planning for the huge concentrations of population which are going to occur in the next 15 or 20 years. How we provide water for them, how we conserve it, how we reuse it, and a hundred other questions that you could bring up. I hope our friend Dr. Renne is still in the room and will keep in mind some projects in basic research, hard constructive thinking, as to how we in this country are going to deal with these problems 15 to 20 years from now. In some instances they are not that far away, they are here now.

Dr. MORGAN. Senator, you as a lawyer would be interested, I am sure, in one of the projects that has already been initiated in the Institute in Colorado. It deals with this very thing you are discussing, except it starts at the bottom with one small facet of it.

If I may put in general terms what you have just said, you are concerned with the overall problem of water management, and water management requires manmade institutions such as commissions, and the like, to develop plans and to carry them out.

Basically, these institutions must operate within the framework of water law and, of course, all of the law, but specifically water law. So one of the projects now under way in cooperation between Colorado State University and the University of Colorado Law School under, I believe, a professor you may know—Professor Sax—is to make a very detailed inquiry into one part of the foundations of water law in our State of Colorado.

This has led him, I understand, into the labyrinth of reclamation law, because much of our water in that State is derived from reclamation projects.

Now, this is illustrative also of how a project that is designed to be applicable to one small area; namely, the State of Colorado, may lap over into the area of basic findings that might or might not be applicable some place else.

We feel that in the next dozen or so years in our State the pressures you have described in terms of the development and concentration of population along the east face of the mountains will require possibly some drastic action, and certainly some very searching effort in the total overall management of water, and we are bound to need the most reliable advice with respect to the basic law of water when we get to that point.

So this really is the objective of starting this project now with the University of Colorado Law School.

Senator ALLOT. Thank you very much, Dr. Morgan. I appreciate your statement. It was very helpful, but more than that, I appreciate your remarks, which have been more helpful even than your statement.

Thank you very much.

Senator ANDERSON. Senator Moss.

Senator MOSS. I have no questions. I do appreciate Dr. Morgan's appearance, and the fine work that he has done in this field as a leader of the land-grant college group. We are very proud of the work done in our land-grant college in Utah.

Dr. MORGAN. You should be.

Senator MOSS. We do appreciate the fine work you are doing.

Dr. MORGAN. At the risk of being impertinent, may I say that I know the work being done in Utah to be exceedingly good, because you

hired away from our campus the dean of engineering on the Utah State campus, who is responsible for the water program over there, and we would like to have him back.

Senator MOSS. We will not give him up.

Senator ANDERSON. No further questions?

Thank you very much, Dr. Morgan, and please feel free to write us and tell us your opinions, because they have always been extremely valuable and always welcome. Thank you very much.

Dr. MORGAN. Thank you, sir.

Now, Dr. Frey, who represents another member of our association, the Pennsylvania State University, has a statement to file with you and with your permission, may he comment on it?

Senator ANDERSON. Go ahead, Dr. Frey.

STATEMENT OF DR. JOHN FREY, OF PENNSYLVANIA STATE UNIVERSITY

Dr. FREY. I, too, have a prepared statement which I would like to read, if that is satisfactory with the committee.

My name is John C. Frey. I am director of the institute for research on land and water resources at the Pennsylvania State University, and I appear as a representative of the National Association of State Universities & Land-Grant Colleges.

S. 22 represents a desirable modification of the present act. It makes possible supplemental funding for educational institutions that are establishing institutes under title I, and it authorizes much more adequate funding for other institutions that wish to participate in the research and training program.

Educational institutions that are establishing institutes under title I will be in need of supplemental funding to properly carry out their many prescribed duties. Modern research technology permits exploration of extremely complex resource problems, but the costs of undertaking these investigations generally are quite high.

Special purpose projects in the \$75,000 to \$100,000 class have become quite commonplace in many of our leading colleges and universities. Relatively speaking, the authorized appropriation for a State water resources research institute is very modest, indeed. With limited assistance, institutes are responsible for the conduct of research in many fields of water, together with the responsibility of providing training for our future hydroscintists.

Moreover, it becomes the duty of each institute to arrange for cooperative research and training programs with other institutes and with such agencies and individuals of the State as may contribute effectively to the solution of water problems.

Even with matching funds as provided for under section 101 of the act, institutes may not be able to participate effectively for lack of counterpart funds.

Institutions of higher education, other than those that are establishing institutes under title I, often have outstanding scientists on their staffs, and further, may be extremely well qualified to undertake a program of water resources research because of location and special facilities or because of their academic services capability. Seldom does

each institution in a State have strong programs in all disciplines of knowledge. There is a tendency toward specialization with each institution making its contribution in only a few fields.

It is almost an insurmountable task to bring the services of all qualified scientists of a State into the water resources research program of a single institute. Coordination of efforts is possible, but joint participation in research operations often is impractical. Independent financing appears to be the most feasible approach if the services of scientists in several different institutions are to be employed. Title II funds are appropriate for this purpose, but must necessarily be increased if more institutions are to participate.

In broad context, organization for an effective program of water research should insure that the researcher, the policymaker, and society in general are all striving toward the attainment of a common set of objectives. These objectives might be identified as follows:

One, to develop a broad-based interdisciplinary program of research which will aid in the making of resource policy decisions.

Two, to facilitate under long-range public commitments the earliest possible attainment of research findings.

Three, to establish a process of carrying out research programs which will insure maximum returns on research dollars invested.

Attainment of these objectives—breadth, speed, and efficiency—quite logically requires an operational framework with orderly procedures for program planning, expeditious procedures for program implementation, and objective procedures for program appraisal. To the extent that these conditions are met, the purposes really of the Water Resources Research Act will be achieved.

From the standpoint of a research administrator, it seems clear that the provisions of S. 22 would enable the Secretary of the Interior to establish project priorities within a coordinated framework of research, provide for rapid review of research requests, maintain continuity in the funding of research programs, and channel flows of research findings to resource policymakers. These matters are of vital concern to research personnel at the State level who wish to participate in this very important water resources program.

Senator ANDERSON. Thank you, Doctor. I am glad to see that you agree that the kind of financing provided by S. 2 appears to be a feasible approach to get scientists in all parts of the country to serve and cooperate with different institutions.

One of the purposes of title II of S. 2 of the last Congress was to make available the services of persons needed, no matter whether they are in your State or some other State, wherever they are, whether they are in a private or public institution.

Do you have any questions, Senator Allott?

Senator ALLOTT. I have no questions.

Senator MOSS. I have no questions.

Senator ANDERSON. Thank you very much.

We have an old friend here, Sam Thompson, who is representing the Interstate Conference on Water Problems of the Council on State Governments.

Sam, we are always glad to have you here. We appreciate your coming.

STATEMENT OF SAM THOMPSON, INTERSTATE CONFERENCE ON WATER PROBLEMS OF THE COUNCIL ON STATE GOVERNMENTS

Mr. THOMPSON. Thank you, Mr. Chairman. I have with me Sam Swan, who is a colleague in the Washington office.

My name is Sam Thompson. I am chairman of the Mississippi Board of Water Commissioners, but today I am appearing on behalf of the Interstate Conference on Water Problems.

Two years ago I had the honor of presenting to this committee a statement by the interstate conference on the then pending S. 2, now Public Law 88-379. At that time we supported the pending legislation, including what was title II of that bill. We continue that support as is indicated by a resolution adopted at our 1964 annual meeting, a copy of which is appended to this statement.

Mr. Chairman, we wish to congratulate this committee and the Congress for its wisdom and foresight in enacting recently such far-reaching laws as the Water Resources Research Act, the wilderness bill, and the land and water conservation fund bill, and, in this Congress, in having moved so rapidly toward enactment of the water resources planning bill. Together with S. 22, these measures represent a recognition of the vital significance of water as a natural resource and a commitment on the part of Congress that the resource shall be conserved, used, and developed in a manner that will afford the greatest benefit to all our people today and in the future.

It is, of course, with respect to the future that S. 22 deals. We know of the ever-increasing demands on our water supplies. We cannot hope to meet such demands without a continued evolution in basic data collection; improvements in techniques in using and reusing water; enhancement of our ability to store and distribute water; and ever-increasing the supply of water.

Obviously, many of these needs are being met, at least in part. For many years basic data collection has been carried on cooperatively by the U.S. Geological Survey and the States. Efforts to control and abate pollution have been stepped up in recent years, and pending Federal legislation provides for further acceleration.

Under a number of programs storage of water and its distribution are furthered. Research in and development of methods to desalt saline and brackish water offer great promise.

S. 2, or, as it was passed, Public Law 88-379, in time will add substantially to our capacity to supply our expanding population with water adequate in quantity and quality. It will strengthen the contribution that universities, particularly land-grant and State universities, can make to water resources research, and it will stimulate education of scientists in water and related fields of inquiry.

However, with all due deference to the Congress, Mr. Chairman, we believe the bill reported by your committee last Congress was stronger in one important respect than the legislation adopted finally. The present bill, S. 22, would correct that deficiency.

We support S. 22 because we believe it will lend an added measure of flexibility to the water resources research program already authorized by Public Law 88-379. We recognize and we respect the capabilities of land-grant colleges and State universities. We point out,

however, as we have done consistently, that the location of research capacity follows no pattern.

It may exist, in fact it does exist, in existing public and nonprofit water research agencies and in engineering consultants.

Among such research institutes and engineering consultants is a substantial competence not ordinarily found on land-grant and State university campuses—a competence in which we, as State water resources administrators, have a vital interest. Many of these institutes and engineering firms have devoted much time and talent to municipal and industrial water problems.

To illustrate, we understand that a State water commission has proposed to the Department of the Interior a study of the comparative effectiveness of various types of State law and regulatory mechanisms. In the results of such a study our membership would be most interested.

Mr. Chairman, under the terms of title II of Public Law 88-379, State water research institutes may not undertake research to further the mission of the Department of the Interior. This prohibition—which would be lifted by S. 22—we regard as unwise. A number of such State institutes are well qualified to do such research. Indeed, we understand that the Department has received project proposals from some of them.

To sum up, Mr. Chairman, the Interstate Conference on Water Problems believes it important to utilize research capability wherever it may exist—in public and private colleges or in other public agencies or private organizations. We believe that S. 22 will further that end.

We support the bill.

Senator ANDERSON. The resolution adopted at the conference will be included in the record at this point.

(The resolution referred to follows:)

RESOLUTION ADOPTED AT THE SEVENTH ANNUAL MEETING OF THE INTERSTATE CONFERENCE ON WATER PROBLEMS, DECEMBER 7-8, 1964

III. WATER RESOURCES RESEARCH

Whereas the Interstate Conference on Water Problems by resolution in 1962 urged that then pending Federal legislation provide for using as nuclei for water research institutes existing public and nonprofit water research agencies attached to State or private universities or to nonuniversity connected State agencies; and

Whereas, as approved by the Senate, this legislation also would have provided in title II for an additional \$5 million program to support research into any aspects of water problems which may be deemed desirable and are not otherwise being studied, a provision amended substantially in the legislation as passed; and

Whereas Public Law 88-379 provides that such institutes be attached to land-grant colleges unless another college or university is designated by the State: Now, therefore, be it

Resolved by the Interstate Conference on Water Problems, That it support legislation similar to title II as included in the Senate version of the water research legislation considered by the 88th Congress so as to achieve a greater degree of flexibility in administration.

Senator ANDERSON. Thank you, Mr. Thompson. We appreciate your statement very much. I am glad you point out the location of research capacity follows no pattern. You want to find it no matter where it is. We appreciate that. It is a fine thing.

Mr. THOMPSON. We think the problems are varied enough, legal and physical, Mr. Chairman, that it is going to take the total com-

petence that we have in all fields in order to meet them for our expanding population in the future.

Senator ANDERSON. Last year's bill, as enacted, did not do what the present measure would do. You realize that I tried my best. We are glad to have support from you today for those things we had to leave out in the Water Research Act.

Mr. THOMPSON. We appreciate the effort that you made last year, and we hope that this year you will be successful.

Senator ANDERSON. Thank you.

Senator MOSS?

Senator MOSS. Thank you, Mr. Thompson. It is a very good statement, and I compliment you on it. I am very pleased, indeed, to have your support of the bill.

Senator ANDERSON. We are glad you could come again.

Mr. THOMPSON. Thank you, sir.

Senator ANDERSON. Dr. MacArthur, we are glad to have you here.

STATEMENT OF DR. DONALD M. MacARTHUR, MANAGER, CHEMISTRY AND LIFE SCIENCES RESEARCH CENTER, MELPAR, INC.

Dr. MACARTHUR. Mr. Chairman, Senator Moss, I am manager of the chemistry and life sciences research center at Melpar in Falls Church, Va., and also a member of the Water Research Council. I appreciate the opportunity to appear before you today.

The importance of controlling and providing quality water for our increasing population and industrial needs has been recognized for some time. Progress in this area has been slow primarily due to the lack of sufficient resources to develop the necessary technology.

The bill under consideration, S. 22, is long overdue. It will allocate resources more in line with the magnitude of the problem and will insure that the wealth of talent and technology in colleges, universities, and industries across the country is brought to bear on the problem.

The most effective approach to fulfilling the short-range needs is through the application of currently available technology. The purpose of this testimony is to demonstrate, using four or five typical examples, that defense and space technology, which has been developed on programs not directly concerned with water resources, has immediate application to water quality measurement, water purification, and water conservation.

Water quality measurement: Regulation of water quality for domestic, industrial, agricultural, and recreational use is difficult without proper chemical monitoring systems.

Incidents such as outbreaks of epidemics in metropolitan cities served with modern water treatment facilities, bacterial food poisoning traced to Great Lakes smoked whitefish, and infectious hepatitis traced to oysters all point to the necessity of continuous biological monitoring of water supplies.

Government research and development efforts over the last 15 years have included work on special devices to detect and monitor trace quantities of toxic chemicals and pathogenic biological material. In response to these requirements industry has developed a steadily improving array of sensors.

Equally advanced instrumentation technology has been developed under the space program. By way of example, I would like to cite the development of a miniaturized gas chromatograph that will continuously monitor extremely low concentrations of 75 organic compounds of widely differing composition in the Apollo spacecraft environment. This unit could easily be modified to detect pesticides and other organic pollutants. In addition, studies on the detection of extraterrestrial life have led to the development of instrumentation capable of automatically and reliably detecting bacteria and viruses at very low concentrations.

Turning now to water purification, water purification methods may be classified into: one, physical removal of foreign substances; and two, detoxification without removal. Physical techniques include filtration and distillation. Methods which reduce toxicity include sterilization and chemical transformation.

Recent research on the purification of water contaminated with highly toxic materials has led to new techniques.

This work showed that conventional filtration techniques would not remove suspended materials in colloidal sizes. Extended studies showed that passing water through a sand bed covered with a thin layer of diatomaceous earth effectively removed colloidal suspensions.

Activated charcoal absorption systems are not only expensive but cannot be economically regenerated. But current work indicates that low-cost materials like coal, china clay, and silica gel can be upgraded to possess adsorption capacities similar to activated charcoal by suitable pretreatment methods.

One final example: the stringent requirements of long-term manned space flight are leading to the development of improved adsorption and filtration methods capable of providing potable water from fuel cell effluent and human waste materials.

Turning now to water conservation: Good water management practices require that sources of water loss be controlled. One of the most obvious areas of attack is the water loss from reservoirs.

Methods involving the spreading of monomolecular layers of organic materials have been shown to decrease the rate of evaporation of water. The transfer of this process from laboratory to reservoir operations has not been successful.

One of the most important aspects of evaluating the relationship between the evaporation rate and the retardation efficiency is the method of water loss measurement. The current method of recording changes in water levels does not establish a direct cause-effect relationship between the presence of evaporation retardant and water loss.

Recently developed infrared sensor systems can, however, measure the critical property of water reservoir covered with evaporation retardant. The amount of water vapor in the air over a reservoir can be monitored continuously. This means that the rate of evaporation can be measured directly over very short time periods, which then permits direct correlation of evaporation rate with the presence of retardant on the water surface.

This does not solve the problem of water loss. It does represent, however, an applied research tool now available which can be used to completely evaluate a variety of retardants in a variety of field situations. In this way the feasibility of this often-proposed approach can be definitely determined.

These few examples help to illustrate that a sound research program on effective water resources utilization can be based upon currently available technology from the national research and development complex.

Organizations in the defense and aerospace industry, such as the one I represent, cannot afford to speculate by establishing facilities and initiating company-sponsored programs unless there is a clearly defined demand for services. It is sometimes said that defense contractors will not or cannot "diversify," but you will find that these contractors are aggressive enterprises, and will move quickly and apply all their technological resources once they see an effective demand. Most industrial groups, along with their associations with nonprofit and university organizations, are capable of meeting any product specifications if there really is a demand for the product. This has been illustrated time and time again in our military and space programs. Therefore, to exclude from the attack on water resources this industrial capability, or to limit artificially its involvement, is to overlook much of the history of this country's technical progress.

That is the end of my statement.

Senator ANDERSON. Thank you, Dr. MacArthur. I am very much interested in one paragraph here where you say "one of the most important aspects of evaluating the relationship between the evaporation rate and the retardation efficiency is the method of water loss measurement."

You refer to these attempts to control the rate of evaporation of water and you say the transfer of this process from laboratory to reservoir operations has not been successful.

Do you think the process is promising or do you think it is going to be difficult to establish? I have seen a number of articles on spreading oil on top of reservoirs; what would it do to retard evaporation? Of course, retarding evaporation is important. There are two large reservoirs in Arizona which involve substantial losses as a result of water evaporation.

Mr. MACARTHUR. Mr. Chairman, I quite agree; water loss from reservoirs is one of the biggest problems we have: 71 percent of the total average rainfall in the United States, or 3,000 billion gallons a day, is lost through evaporation and transpiration processes. These techniques I refer to, of spreading monomolecular layers of organic materials on water, work very well in the laboratory but when you transfer it to the field situation, for example, a reservoir situation, you have problems of film breakage and pile up due to wind-and-wave action. There are other techniques that could be applied, one of which involves the utilization of reflective or emissive films or coatings. Again a lot of work has been done here under R. & D. sponsorship for other applications. One area I know of is that of countermeasures at sea utilizing reflective films. I think this approach also has potential. More effort has to be put into this total area but one of the drawbacks right now, as I tried to point out, is the fact there is no good way of evaluating how good evaporation retardants are. An example is that an individual looks at the water level one day and comes back the next day and looks at it again. In such a case the difference in water level might be due to evaporation, seepage, drainage, or transpiration from plants at the side. This system I talked about today that has been

developed for other applications actually looks out over the water surface and measures the rate of evaporation as it is actually occurring. In this way you have a very simple technique for comparing one film with another and determining the retardation efficiency of each. It could be an extremely useful research tool.

I think this area of water evaporation retardants has to be continued, but more concentrated effort has to be put into it if its full potential is to be realized.

Senator ANDERSON. Thank you very much. If you have any material in your files that illustrates why you believe evaporation control has not been too successful so far, I would appreciate it if you could give us a little summary. That is, why it has not been successful, where it has not been successful.

Dr. MACARTHUR. It has not been as successful in field situations as it has been in the laboratory. In the laboratory one can reduce the evaporation from water surfaces dramatically by putting monomolecular things on the surface. When you go to the reservoir, the films break and pile up due to wind and wave action and you do not see the same reduction as you do in the laboratory. There are many operational problems and I think a lot of these have to be looked at more thoroughly. Laboratory and field studies have been carried out in this area over the last 20 years. Field examples that readily come to mind are Lake Hefner, a 2,500-acre lake in the State of Oklahoma, and Elephant Butte in the Rio Grande in New Mexico. In summation it has been found that wind is a major factor and that the most severe problems are application and maintenance of the films.

Senator ANDERSON. Dr. MacArthur, you have not testified before this committee very much, and I would appreciate it some time if you would, for my own information, if nothing else, supply me with a résumé of where you have been and studied, because, obviously, you are a scientist and we would like to keep up with you.

Dr. MACARTHUR. Thank you, sir.

(The information requested is as follows:)

MacArthur, Dr. Donald M., 5313 Albemarle Street NW., Washington, D.C.

B. Sc. (Hons.) Chemistry, St. Andrews University (Scotland), 1954.

Ph. D. Physical Chemistry, Edinburgh University (Scotland), 1957.

1957-58—University of Connecticut, instructor, Department of Chemistry.

1958 present—Melpar, Inc., Falls Church, Va., manager, chemistry and life sciences research center.

Responsible for the management and technical direction of a group of over 200 scientists representing a broad spectrum of disciplines from instrumentation engineering to biology, including instrument design and development, physical chemistry of solutions, materials research, toxicology, biophysics, and medical virology.

Presently responsible for the management of research and development programs in the following general areas:

1. Detection instrumentation: This involves research on concepts for sophisticated physico-chemico analyses, which have been incorporated in to variety of detection systems for monitoring trace concentrations of toxic biological and chemical substances.

2. Life sciences: This includes research on mechanisms of induction of cancer by viruses, development of therapeutic agents, and the utilization of biological systems for the production of energy.

3. Atmospheric sciences: Research on the development of experimental methods which will permit detailed study of the movement of particulates suspended in the atmosphere under various meteorological conditions.

4. Natural resources: Research here includes membrane processes for desalination of water, conversion of coal to economically useful synthetic intermediates,

and the development of techniques for the reclamation of soil contaminated by pesticides.

5. Space sciences: Research on the physical and chemical processes occurring in cometary tails, design and construction of instrumentation for the detection of extraterrestrial life, and research on the effects of remote sampling procedures on the viability of extraterrestrial organisms.

Senator ANDERSON. Senator Moss?

Senator MOSS. I was very interested in your testimony, Dr. MacArthur, in having you point out that there are many avenues of research that really we may be containing our thinking on this water research to a much narrower field than we should do.

Would the types of things that you have mentioned here normally come to the attention of this water research listing that we have talked about so that we could take advantage of them?

Dr. MACARTHUR. First of all, let me say that these examples were very simple examples, and to answer your question, I think Dr. Renne or Mr. Eaton of the Office of Water Resources might answer this better in terms of whether they have technical coordination with other Government agencies, particularly defense and NASA, to keep informed on applicable programs. Of course this is where the Office of Science and Technology should be of assistance.

I come from industry, and I have talked to appropriate people on water problems many times, and this is one area that I have been hammering at. There is a lot of technology being developed for other applications that might be overlooked. Of course the fundamental problem here is one of technical information dissemination which today is a very big problem.

I feel very strongly about this.

Senator MOSS. Is the technology developed in areas like this published widely and therefore readily available?

Dr. MACARTHUR. It is generally in the public domain and most of this work I referred to has been done under Government sponsorship, but there is so much work being done under Government sponsorship and so many reports being generated that it is sometimes difficult to get quickly at what you really want. I think better systems have to be developed and employed to make sure that the technologies available are brought to the attention of the people who can use them. As Senator Allott said earlier today, a lot of people have been in the water research business and have gone over it and over it, and that is true. However, it is one thing to understand and recognize the problems. The other thing is to solve them, and there are many ways of solving any scientific engineering problem, and I feel that in many cases utilizing the technology we have, if it is far enough advanced, is certainly the quickest approach to it.

Senator MOSS. I do appreciate your underlining the fact that many of our commercial organizations are indeed working on this problem and that they contribute greatly in this field.

Dr. MACARTHUR. Yes. As an example of this area of utilizing existing technology the State of California, I think, has taken the lead recently. They have awarded a program to Aerojet General to look at the water situation in the whole State of California and look at it from an overall systems standpoint.

Aerojet General are certainly in category I am talking about.

Senator MOSS. Thank you.

Senator ANDERSON. Thank you. Senator Kuchel?

Senator KUCHEL. I have no questions but I wish to say I am most interested in your statement, Dr. MacArthur. It illustrates pretty concretely why this is a piece of legislation that must be speedily enacted into law.

Thank you very much.

Senator ANDERSON. Thank you, Doctor.

Dr. Kelley, I think you have done a lot of work on monomolecular layers on the ground, and so forth. We appreciate your being here.

STATEMENT OF DR. OMER J. KELLEY, MANAGER, AGRICULTURAL RESEARCH CENTER, STANFORD RESEARCH INSTITUTE

Dr. KELLEY. Thank you, Mr. Chairman, Senator Kuchel, and Senator Moss. I appreciate the opportunity and consider it an honor to talk to you about S. 22.

I am representing, you might say, two groups this morning. I am a member of the Stanford Research Institute staff and also I am a member of the Water Research Council.

Senator ANDERSON. Maybe you can answer this question. Is the Stanford Research Institute a part of Stanford University?

Dr. KELLEY. The only relationship we have with Stanford University is they own us. We have a separate board and president. However, our directors are common in some extent, so that our rules and regulations are different in the university, but the university does own Stanford Research Institute.

Senator ANDERSON. I hope you do not mind my asking that question.

Dr. KELLEY. Of course not. I might mention we have around 2,600 employees at the institute. We are what is known as a nonprofit research organization. We are nontax supported and nonendowed. We do research for the Government and they pay for research on a project-by-project basis. Last year our volume was a little over \$40,000 of research, so we are a sizable research organization.

Senator ANDERSON. Thank you.

Dr. KELLEY. With that as background, I would like to read the statement I have. I will comment just a little bit once or twice in this particular statement.

The Water Research Act passed by the 88th Congress was a step in the right direction, and the Congress is to be commended for this action. As good as it is, however, it still does not go far enough. The present bill now being considered, S. 22, is excellent, and, if passed, will provide the needed legislation for a complete water resource research program.

I come from the western part of the United States where the water needs are already overtaking most of the available water supply. Obviously, however, the West is not alone with respect to water problems today. Water problems exist throughout the United States. That these problems are extremely important and are becoming more critical every day has been clearly documented many times.

Your committee, through the Select Committee on Water Resources of the 86th Congress, has been one of the most active groups in the United States to so recognize and document these problems.

The National Water Research Symposium, which was held in Washington, D.C., in 1961, and supported by the National Association of Soil Conservation Districts and the National Reclamation Asso-

ciation, also did an outstanding job in identifying and bringing research efforts up to date in this important field.

I, therefore, feel that there is no need to attempt to list the many water problems to a well-informed group such as yours. Rather, I should like to discuss the tremendous opportunities that exist for solving the water problems throughout this country and some of the steps that need to be taken to bring about these solutions.

Being a research man, I naturally believe that all problems can be solved by research if enough time and effort, and this means financial support, are devoted to proper research. Obviously, one usually can overresearch a problem, but there is certainly no immediate danger of this happening to our water resource problems.

To be sure, we have made progress in the past with relatively little research. In relation to the amount of money invested, this progress has been substantial, but in relation to the needs and opportunities that exist, it has been slow. The need for solving the many water problems seems to be increasing exponentially with time. In many areas today, all of the immediately available water supplies have already been allocated. In other areas, the quality of the remaining water has become so poor that it has questionable use for human consumption and for agricultural and industrial purposes. While these situations are alarming, they need not be discouraging because science has been progressing.

The real need is to advance knowledge and to apply our newer scientific learning to the field of water resources.

The land-grant institutions of America have excellent research talent and, over the years, have done a fine job of research. They are capable of doing even more and better research with increased financial support. They represent, however, only a part of the talent and a part of the competence that is available for this important research task.

The non-land-grant institutions, both State and private, have a wide diversity of facilities, brain power, and technology that could and should be made available for water resource research. These institutions can bring different kinds of experience, training, and different approaches to water problems.

I might comment here on a water problem we have been working on recently at the institute. A company came to us with a boron problem in their water they wanted to put back into the underground aquifer. Normally, there are several ways one might want to do this. This is not much material to take out of water. This problem has finally been solved by an organic synthesis chemist, a person one would not ordinarily expect to be working in the water field, a man who knows probably little, if anything, about water, certainly nothing about hydrology or plants. But he does know something about organic chemistry and he has synthesized a chelating agent, which is a new agent that will take the boron out of the water, and this is in trace amounts.

I just point this out because I think it shows an example of bringing in other disciplines than one would normally expect in this kind of research.

Just think for a moment of the vast storage and transportation facilities that are being planned today which will permit water to be

transported not only within a State but from one region to another. Such facilities set in motion a whole series of problems requiring research not only in the physical and biological sciences, but also in the social and legal and political areas. In many cases, the required solution of the problem involves the interworking of these various factors.

I would like to consider one problem that has always been of particular interest to me, that is the loss of water through evaporation from soil surfaces. If we take the State of Arizona, for example—this would apply in a lot of the Western States—about 80 million acre-feet of water falls every year in the State of Arizona. If you try to account for this in terms of underground accretions or stream-flow, one can only account for about 5 or 6 million acre-feet. What happens to the rest of it? The remainder of this water is lost either through evaporation from the soil surfaces or through evapotranspiration from nonbeneficial plant growth. Here is an area where very little research is being done today. Practically nothing.

If one could find a way of preventing, say, the soil surface from taking in the water and collecting this water runoff, this would be a tremendous source of water.

In a 12-inch rainfall belt, 1 acre will yield 20,000 gallons of water. If one is to collect this water by runoff, there are three or four things necessary. First you have to make the soil impervious to water; secondly, one has to prevent plant growth; third, one has to stabilize the land so it will not erode. These three problems offer a straightforward situation. Today we know we can make soil impervious to water very easily. This is no problem and can be done without much cost. We can keep the plants from growing. We certainly do not know how to prevent land erosion when we take off the plant growth.

I point this out because it is important to find a way of saving the water in such a problem. Such research will require physiologists, chemists, biologists, engineers, and economists to just obtain answers.

There are two important aspects of scientific research on any problem. One is the advancement of the sciences needed for the solution of the problem and the other is research oriented to a solution of the problem using the level of scientific knowledge available in the required sciences.

The private research institutions are generally more oriented to problem solving than public agencies, and they have a great capacity to bring a multidisciplinary approach to the solution of any given problem.

The tax-supported research institutes are generally more oriented to research designed to advance knowledge in a given discipline, and these advances can then be put together for problem solving. The point I wish to make is that both approaches are important and necessary, and the bill that we are discussing today would make it possible for both approaches to be used to the fullest extent.

It is our belief that the program envisioned by this bill will be extremely efficient and in the best interest of the taxpayers. It is designed to require a minimum number of Federal employees and to use facilities that are already in existence in State and private institutions.

The research will all be done by contract or grants and, hence, can take full advantage of centers of excellence for any given phase of the research problem.

Scientists of outstanding caliber can be made available through this approach. A scientist will not have to be at a given location or a specific Federal laboratory for his services to be used. Another very important feature of this type of research is that nonproductive efforts can be quickly terminated and new and important problems studied as they arise.

The program envisioned in Senate bill 22 has long been needed.

I thank you.

Senator ANDERSON. Thank you very much, Dr. Kelley.

Since you came from Senator Kuchel's State, I am going to let him start off the questions.

Senator KUCHEL. Dr. Kelley, I am happy indeed to have you come here from the State I have the honor to represent in part, and spell out some of the almost unbelievable areas in which scientific research can be utilized for the public good in solving domestic problems.

The specific example you gave with respect to the rainfall in Arizona is astounding. In our State north of where you live it seems almost incredible that after many generations we still have floods which permit a tremendous loss of water. This represents another kind of question that is going to have to be resolved by research and then by appropriate legislation in the Congress.

There is no need for me to make a long comment except to tell you that many months ago the senior Senator from Arizona, Mr. Hayden, had a group of us together and we listened to people in the Atomic Energy Commission giving their views on how vast quantities of water might be transshipped into areas of shortage from areas of surplus, and be done in a fashion that would permit the Federal Government to participate on an economically feasible basis.

The proposed legislation before us today is going to pass. I think the comments made by the chairman of this committee, by some of my colleagues here on duplication, certainly indicates a sound approach where duplication of effort is inimical to the public interest.

I think we will help to avoid duplication of effort by utilizing the techniques, and if I may say so, the brains, of all kinds of institutions of higher learning—public, private, land grant, and nonland grant—and to that extent I think it is very good for you and the gentlemen who have preceded you to demonstrate the multiplicity of scientific questions which arises in this field.

All I can say is that I thank you very much for coming here and making the statement.

Dr. KELLEY. Thank you.

Senator ANDERSON. Senator Moss?

Senator MOSS. I do not think I have any questions of Dr. Kelley. I also compliment him on his presentation and his suggestion that private institutes can be most helpful in moving into the various phases. The thing that I come back to which I commented on before is the great diversity of research that impinges on this one thing of preserving the water or improving the water. It is obvious that we must extend into many different fields, some that probably do not even occur to us at this time. We should be flexible enough and diversi-

fied enough that we can make sure that we are probing in every direction where research can be beneficial.

Thank you, Dr. Kelley.

Senator ANDERSON. Thank you, Doctor. We appreciate your statement very much and hope you will keep in touch with the committee.

Dr. Bregman is our next witness.

When we finish today—we have one more witness after Dr. Bregman—we will adjourn until 10:30 tomorrow morning. There is an executive session of the committee at 9:30, and I thought it best to save an hour for that, so we will start tomorrow morning at 10:30.

STATEMENT OF DR. JOHN I. BREGMAN, MANAGER, WATER RESEARCH CENTER, IIT RESEARCH INSTITUTE, CHICAGO

Dr. BREGMAN. Mr. Chairman, Senator Moss, I am honored to have this opportunity to appear before you on behalf of the two organizations I represent. I would like to begin my statement by identifying them for you.

The first group is the Water Research Center at the Illinois Institute of Technology, of which I am manager. Some 1,600 scientists and supporting personnel at the IIT Research Institute are engaged in a wide variety of Government and industrial research programs. We cover a number of scientific disciplines such as physics, chemistry, metallurgy, ceramics, astrosiences, electronics, mechanical engineering, life sciences, and computer technology.

The recent upsurge in research in various phases of water resources has led to the establishment of a water research center in our organization so that our activities in this area may be better coordinated and tuned to the national needs.

The other organization I represent today as their chairman is the Water Resources Research Council. This is a nationwide group made up of representatives of a number of universities, research institutes, and industrial firms that are concerned with our water problems. A partial list of organizations represented on the council is as follows: Indiana University, Cochrane Corp., Midwest Research Institute, Travelers Research Center, IIT Research Institute, Mellon Institute, Ionac Chemical Co., Princeton University, Cornell University, Battelle Memorial Institute, Massachusetts Institute of Technology, University of Florida, Stanford Research Institute, Resources for the Future, Inc., Melpar, Inc., Cyrus W. Rice & Co., Dorr-Oliver, Inc., Drew Chemical Corp., Johns Hopkins University Industrial Water Engineering Magazine, Polytechnic Institute of Brooklyn.

At a meeting of this council held in Washington in December of this past year, the situation with regard to water resources research was the subject of an all-day conference. The conferees then adopted the following resolution which I would like to read to you:

We, the members of the Water Resources Research Council, meeting at the Brookings Institution, Washington, D.C., on December 17, 1964, and representing universities, research organizations, and industries of America recognize the vital importance of water as a natural resource and the critical role of research in providing knowledge to assure the conservation and best possible use, in the broadest sense, of the national water resource, and do hereby commend the 88th Congress for its wisdom and foresight for passing the Water Resource Research Act of 1964; and

Whereas the Water Resource Research Act of 1964 is a significant step forward, it is still inadequate to meet the water resource needs; and

Whereas water resource problems are becoming more critical throughout the Nation: Therefore be it

Resolved, That we request the U.S. Congress to implement in full the appropriations recommended in title I of the Water Resource Research Act of 1964 and take any additional action necessary to enact legislation as stated in Senate bill 2 of the 89th Congress as it relates to title II of that bill; and be it

Resolved, further, That we make known to the Congress the availability of research talent and facilities that can be brought to bear on national water resource problems only through the full implementation of title II, as stated in the original S. 2 of the 88th Congress.

Gentlemen, I would like to sum up the attitudes of the organizations that I represent with the following comments:

First, we would like to congratulate the U.S. Senate, in general, and this committee and subcommittee specifically, on the awareness of our national water difficulties that you showed last year when you passed the Water Resources Research Act of 1964.

It is particularly encouraging to observe that in addition to the immediate corrective measures that can be taken in the area of water pollution prevention and to the longer range program of the conversion of saline water to fresh water that you have developed, you also have had the foresight to recognize that the ultimate solution to the more effective utilization of our national water resources is dependent to a great extent on breakthroughs in research on new approaches to water conservation and reuse.

It is true that we are not yet utilizing all our knowledge on pollution prevention and water conservation, but it is also true that dramatic new developments are necessary that can only come about through an adequate research program.

The Senate version of last year's bill, S. 2, made a promising start toward marshaling the research capabilities of our country into an attack on the problem. The final version of the bill as passed by Congress, however, fell far short of our needs. While making a commendable start toward developing and utilizing water research technology at land-grant colleges, the bill, for all practical purposes, eliminated the use of the tremendous amount of water resources know-how that exists elsewhere.

There are large numbers of scientists, expert in water technology, who are anxious to use their knowledge on this problem of national concern and who are frustrated by their inability to do so under the present law. These scientists are employed by universities, research institutes, and industrial firms as well as State and municipal agencies and constitute the overwhelming bulk of our national talent in this area today.

Go to any meeting of significance in almost any phase of water technology today and you cannot help but be impressed by the facts that (a) there is a larger supply of talented researchers in water technology available in our country today than in all the rest of the world put together; and, (b) the overwhelming majority of these talented scientists cannot contribute to our water resources research effort under the present law.

A further ironic touch is the fact that much of the background and knowledge that these frustrated researchers in universities and research institutes have was developed with Government money under

contracts for other purposes by other Government agencies. To fail to utilize this talent that the Government has paid to develop at a time when it is desperately needed just does not make sense.

We urge you, at least from our point of view, and from the point of view of economy, efficient technology, and plain honest patriotism, to allow us to use these skills for our country's benefit.

I should also like to call to your attention the fact of industry's representation and participation in our efforts. Industry has been the whipping boy for a long time in many of our water problems. They now say to you: "We have water technology know-how available and we are anxious to use it to help solve the Nation's water resources difficulties." How can we fail to take advantage of this large reservoir of ability?

I would like to interrupt the statement for a minute here to give you a few examples perhaps pertinent to the industrial problems and to the reuse of water that I think you might find to be of interest.

In 1958, I gave a talk before the Oklahoma Refiners Council on the problem of the reuse of river waters which have been polluted with chromates.

In many refineries, down in Texas, especially, practically entire rivers flow into one end of the refinery and flow out the other end—they flow out contaminated by chemicals such as chromates used in corrosion abatement. I have written a book on this subject. There has been a great deal of effort on the development of materials other than chromates because chromates poison the river water, they are toxic to fish and what have you. Industries realize that sooner or later the States will ban the use of chromates. However, the development of an adequate replacement, one which is effective and economic so that industry can use it, I believe, is beyond the scope of any one particular industrial company. This is the type of problem for which basic knowledge developed by the Government would be valuable because then we could turn to industry and say, "here is a solution to this problem; here is a solution that is economical; here is a solution that we insist that you use because of that fact."

As another example, during the past 5 or 10 years there has been a very dramatic development in connection with the discovery of new chemicals called polymer chemicals that are used to clarify turbulent river water or to settle mine waters in the copper industry, for example, and in the uranium industry. These chemicals, used in very low dosages, have resulted in the savings of a great deal of money and the ability to reuse water because it purifies it. However, most of the work done has been empirical and the knowledge and development of these chemicals belongs to a few organizations, and it is a tightly held secret.

I know this because I helped develop some of these myself when I worked for an industrial water-treating company.

Now, we feel very strongly that a basic research program aimed at an understanding of the mechanism of how these polymeric coagulants work, what the basic chemistry is, how they attach themselves to the clay, to the copper deposits, how they bring this material down, what goes on, we believe will lead to the development of even better coagulants in that this information made available free on a Nation-wide scale will go a long way toward enabling the more efficient purification of a great deal of our water and making it more usable.

Now, getting back to my statement—in terms of specifics, the present water resources research law is deficient in that the funding allocated under title II for research by groups of the types that I represent is pitifully small. The larger sum that last year's Senate bill provided would have allowed the start of an adequate program.

The final amount provided for in the bill is only a token sum. In addition, the complication created by the provision for submission of contracts to congressional committees means, from a very realistic point of view, that title II funding will either be eliminated by the Government, or by the executive branch, or will be filled with delays that are intolerable to scientific groups that must be able to schedule their manpower on the basis of some sort of a timetable.

The same provision applied to other Government research areas would drastically curtail our national research effort.

In conclusion, gentlemen, I urge you to restore the provisions of last year's Senate bill so that our experts in water technology—regardless of whether they are affiliated with universities, research institutes, or industry—can pitch in and devote their abilities to the solution of one of our most pressing problems: sufficient pure water.

Thank you, Mr. Chairman.

Senator ANDERSON. Thank you very much. Of course, the Senate reached that point that you advocate.

Senator MOSS?

Senator MOSS. That is about the only comment I would have, Mr. Chairman. I think this is a very eloquent support of the views of this committee.

Dr. BREGMAN. Thank you, sir.

Senator ANDERSON. Thank you very much for being here. We appreciate your coming today.

Dr. BREGMAN. Thank you, sir.

Senator ANDERSON. Mr. Rice.

STATEMENT OF JAMES K. RICE, PRESIDENT, CYRUS W. RICE CO., PITTSBURGH, PA.

Mr. RICE. Mr. Chairman, Senator Moss, I would like to identify myself. I am a consulting chemical engineer, and I am president of Cyrus W. Rice Co., a research consulting firm, specializing in the technology of industrial water and waste water, and may I apologize for not having copies to distribute to the committee. My remarks are brief. Some of them will be extemporaneous.

My interest in S. 22 has three roots; as a citizen I am interested in appropriate and efficient use of Federal funds.

I might add I certainly appreciated the comments of the chairman and other members of the committee on this subject this morning.

As the head of a profitmaking research and consulting firm, I am interested in the gainful employment of its talents, and as a consulting professional engineer with long experience in industrial water research, I am interested in the problems of its use and disposal. These interests are compatible; I will not attempt to separate them in the remarks that follow.

As the committee is well aware, the various divisions of the Federal, State, and local governments are actively engaged in conducting

or sponsoring research in certain sectors of the general area of water resources. One of the sectors that remains to be covered adequately is that concerned with water for and from industry.

Those problems that are peculiar to a specific industry are and generally should remain in the province of privately sponsored research. There are many problems, however, that are common to most industries, and are properly the subject of publicly sponsored research if they are to be solved in any reasonable period of time and in a coordinated fashion.

The evaporative processes are a good example of a common industrial water use. And here I refer to the processes of using water to make steam for power, for heat, and to use water for cooling by evaporating that water.

The water quality requirements for efficient energy utilization in steam systems are set largely by the necessity to prevent deposit formation in the units that superheat the steam and in the turbines that use it. Can we find a means to prevent these deposits so that the quality requirements can be lowered and water supplies of much lower quality requirements utilized economically? Would this then allow use of waste waters directly?

Industry generally rejects unwanted heat to water. Some of the heat rejection is to water passing through the equipment once and to waste; some to water that is recirculated through a spray tower where air cools it by evaporation and the water returns to cool the process.

In either case, the heat rejected results ultimately in the evaporation of water to atmosphere. Can the rate of this evaporative process, particularly in the river from industrial use, be enhanced by practical means?

And here I digress from my notes. You have heard much about the means of conserving the evaporation of water, reducing the evaporation from bodies of water. Here this may seem to be just the opposite, the problems of enhancing evaporation from water in certain areas in certain streams might allow the absorption by that stream of heat that is otherwise designated as thermal pollution which affects the quality of the stream.

What is necessary to successfully substitute water waste of various kinds for the fresh water normally used to supply recirculated cooling tower systems? How can brackish waters be used economically for cooling system makeup?

In both examples given, successful research would allow poor quality water that is not suitable as a potable source to be substituted for water that is potable and in so doing either preserve or create additional water resources.

The private research in industrial water treatment in the past has been generally in the direction of improving the quality of the water that is furnished to boilers and to cooling towers.

In practice, the treatment to improve the quality supplied to these processes removes matter from the water and in so doing generates several additional parts of waste matter for every part that is removed from the supply. If, instead, the processes themselves could be made more tolerant and could use very much lower quality supplies, less wastes would be generated and previously unusable sources would be tapped.

Much of the ground water in the United States, as I understand, is considered to be brackish. It is not used industrially because of the expensive process of removing the contaminants that make it brackish and make it unsuitable in current technology.

Solutions to problems of the use of the water in an as-is state would allow an economical use and may then create effective supplies where these are now not able to be tapped for industrial purposes.

Senator ANDERSON. I am sure you know that the program of saline water conversion involves two plants for brackish water, also. One is at Redfield, S. Dak., I believe, and one at Roswell, N. Mex. The Redfield plant is working very well. The one at Roswell is not.

Mr. RICE. Mr. Chairman, these processes are in the line of making a higher quality water from the brackish water, as you are well aware. The remarks that I was making are in the direction of allowing an industry or a process to use the water without that purifying step.

As you are also probably aware, the purifying step itself generates waste and that these, in turn, become a problem. If the water can be used as is and ways found to do so economically, it then saves some of the waste and it also, hopefully, would save the cost of that purifying process.

Research on problems such as I have discussed requires a close contact with industry and experience with industrial water treatment. It requires a knowledge of the processes that use the water. Many organizations with such contact and experience and which are capable of relevant research in this sector are either profitmaking research firms or nonprofit private research institutions.

Title II of Public Law 88-379, as it now stands, has the practical effect of excluding these private profit and nonprofit research organizations from research on water resources problems.

The Congress recognized that there is an immediate need for research on water resources, that the existing organizations were not covering all of the sectors of needed research, and that there exists a shortage of trained and experienced people to conduct the research.

I believe it to be consistent with these expressed aims to urge that the talents and experience of the private profit and nonprofit research organizations be utilized fully in this search for solutions to water resources problems.

Amendment as proposed by S. 22 would help to accomplish the goals intended by the law.

Senator ANDERSON. I quite agree with you that this would be desirable and we are hopeful that it can be done.

Senator Moss, do you have any questions?

Senator Moss. I appreciate your statement, Mr. Rice, and it is in accord with my viewpoint.

Senator ANDERSON. Thank you, Mr. Rice.

We appreciate all of you who appeared here this morning, and we will stand in recess until 10:30 tomorrow morning.

(Whereupon, at 12:28 p.m., the committee took a recess until tomorrow, Wednesday, March 3, 1965, at 10:30 a.m.)

WATER RESOURCES RESEARCH

WEDNESDAY, MARCH 3, 1965

U.S. SENATE,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10:30 a.m., in room 3110, New Senate Office Building, Senator Clinton P. Anderson (chairman of the subcommittee) presiding.

Present: Senators Anderson and Jordan of Idaho.

Also present: Jerry T. Verkler, staff director; Stewart French, chief counsel; and Richard N. Little, minority counsel.

Senator ANDERSON. The committee will be in order.

The first witness this morning is Dr. Allen F. Agnew, director of Water Resources Research Center, Indiana University.

Dr. Agnew, proceed, please.

STATEMENT OF DR. ALLEN F. AGNEW, DIRECTOR, WATER RESOURCES RESEARCH CENTER, INDIANA UNIVERSITY

Dr. AGNEW. Mr. Chairman and other distinguished gentlemen, I am director of the Water Resources Research Center at Indiana University. I am personally honored and so is my university to be invited to appear before you to discuss Senate bill S. 22.

I have a prepared statement, and I would like to depart from that, occasionally, Mr. Chairman, if I may.

Senator ANDERSON. If you will.

Dr. AGNEW. As background, I am a geologist, and I have spent 13 years with the U.S. Geological Survey in water work, in the metal mines in Wisconsin and in California, and in ground water work in the State of Iowa. Then I followed this with 7 years as State geologist of South Dakota where half of our work was in water research.

Now I am at Indiana University and we have a field station out in Montana so that we can provide both the western and the eastern look to our water problems and in educating our students and in conducting our research.

Returning to the statement, the passage of Public Law 88-379 was a welcome recognition by the U.S. Congress of the need for a greater water research effort as we attempt to solve the problems that are already upon us, and as we tackle those which will be even more important for the future development of our Nation—the water problems of the future.

The Congress is to be commended upon this investment in our country's future, as recognized not only through its appropriations for water research by university centers under Public Law 88-379, but

also through its appropriations to Federal agencies for their ongoing programs of in-house research and data gathering on water matters.

To depart again, these are exceedingly important activities for providing a groundwork for research by the university centers.

In addition, some industries that create some of these problems will probably be thereby encouraged to invest additional capital in such research.

The awarding of title I designation by the Office of Water Resources Research to States with the land-grant school as the base provides a valuable mechanism for implementing the provisions of Public Law 88-379. It is cheering to see that 14 of those schools have already been so designated, and it is hoped that the 89th Congress in this session will provide supplemental funds so that all of those States in which the land-grant institution or a combination of such institutions that show they are qualified can be designated by the end of fiscal year 1965.

Satisfying though this progress is, as the result of title I of Public Law 88-379, there remains a large resource of research centers and institutes or institutions, both university and nonuniversity in affiliation, whose great research capabilities could be brought to bear on water problems if a workable title II provision could be achieved. Such is one of the purposes of Senate bill 22, introduced by Senator Anderson on January 6, 1965.

This bill would restore the intent and meaning of the Senate version of S. 2 of the 88th Congress, and would thus provide for research grants to be made to non-title-I water research centers for specific projects under an arrangement that is common and successful in several Federal agencies. The requirement of review of project proposal by the Senate and House Committees on Interior and Insular Affairs is a subject which constitutional lawyers should be better able to judge than I.

Why does the Congress wish to review the proposals? This review provision would be excessively consumptive of congressional time, and it is difficult for me as a scientist to recognize what scientific bases or values the committee members would bring to such an evaluation unless some of them are scientists. Each proposal should be judged on its merits, and according to the capabilities of the proposer to carry it out. The bill under consideration, S. 22, effectively removes this objection.

Non-land-grant universities, such as Indiana University, and similar universities in virtually every State could thus receive support that would enable them to carry out research with a far greater total effect. Some of these universities, like Indiana University, have had a viable water resources research center actively engaged in planning and carrying out water research with new emphasis for several years.

Another provision of S. 22 would increase the funds available under Public Law 88-379 from \$1 million annually to \$5 million initially and increasing to \$10 million, thus restoring the impact of this law to the magnitude originally envisioned by the sponsors of S. 2 and companion legislation in the last Congress.

As was brought out so effectively in the hearings on S. 2 and companion measures 1½ to 2 years ago, the demand for water is increasing by a staggering amount, the quality-control specifications are be-

ing refined and otherwise modified as new users and more reuse enter the picture, and water-management decisions with wide-reaching effects are being forced upon us while we are yet ill prepared to cope adequately with the questions.

As I pointed out in my statement to this committee 2 years ago—through Senator McGovern by the way, because I was then in South Dakota—the need for an expanded program of gathering basic data is immense, the need for new methods of handling these data is just as great, and the need for training and educating the personnel who will do this data gathering, research, and decisionmaking is even greater. A healthy start toward the solution of these problems is provided by Public Law 88-379, and its impact will be boosted significantly by an effective title II.

Furthermore, the provisions in the act of an inventory of water resources research projects and of the coordination and cooperation of water research groups, both within and outside the Federal agencies, augur well for an exceedingly valuable total water research effort.

And to digress briefly, at our university and at other universities, in planning for projects in setting up the project proposals, we request from a science information exchange information on similar projects to make sure that we are not covering the same ground. We check with the Federal, State, and interstate agencies which are likewise involved in water research matters either directly or by granted funds. And, as an example of this, the water resources research centers at the universities are beginning to meet in clusters of centers.

For example, we have one meeting set up for the Middle West in about a month to discuss mutual problems, exchange information, so that this type of cooperation, coordination, will be achieved, and that there will be as little as possible of the duplication that was mentioned yesterday in some of the questioning.

Now, as Dr. Morgan pointed out, some duplication that appears on paper as duplication is not necessarily duplication as the work proceeds.

Senator Moss asked Dr. MacArthur yesterday about the broadening of the look in water resources, and this is a point I would like to stress. This is a place where the universities can have much to contribute. They can broaden the multidisciplinary approach to water research matters, not only from the standpoint of the agricultural, engineering, hydrological views, but also from the standpoint of the economic look, the recreational look, the legal aspects, the management and planning aspects. So you can see that the breadth that is needed in our water thinking in the future is available to the universities and through these centers.

You have heard yesterday, and you will hear again today about some of the exciting avenues that this water research can take today and in the future.

It is most invigorating for those of us who are working in the field to be training people who will be able to carry out these tasks in the future.

One of the points that was mentioned yesterday is the matter of thermal pollution. Mr. Rice pointed out that much of the water in the United States is brackish, and, therefore, we are spending funds on means to purify this water to make it less brackish, and he was

looking for research which might enable industry to use brackish water as well as to use the pure water. This would sidestep the intermediate process of purifying the water and getting rid of the waste products that this purification envisions.

I might point out in some parts of the country areas that have been known to have brackish water have been found by recent studies to have pure water at higher or lower levels. In South Dakota we were able to find this. The State geological survey, working in an area that is a brackish water area—as you know, the point at Webster, S. Dak., is an example of this—was able to find sands that had potable water.

This is exploration that has to be carried on by the Federal agencies such as the Geological Survey and water research centers.

A statement yesterday about acid mine drainage causes me to make a comment here. Senator Moss, I believe it was, asked where this drainage problem is, and the States of Ohio, Pennsylvania, West Virginia, Illinois, and Indiana were mentioned. Along this line I might point out that the strip mining problems are not just acid mine drainage problems, but they are also the problems of reclamation of the land, and the restoring of it to recreational potential.

This is an area of interest to some of the water research centers, and certainly, it would be of interest to one of the committee members, Senator Simpson of Wyoming, that reclamation of strip mining there has just begun between one of the coal mining companies and the State natural resources commission, I believe it is.

In concluding my statement, Indiana University congratulates the past Congress in achieving the first step, which resulted in Public Law 88-379, and we urge the present Congress to take the next and equally important step, in passing Senate bill 22.

Thank you.

Senator ANDERSON. Thank you, Dr. Agnew.

Off the record.

(Discussion off the record.)

Senator ANDERSON. Back on the record.

Do you have any questions?

Senator JORDAN. No questions.

Senator ANDERSON. Dr. Agnew, your statement was a most interesting and constructive one. I thank you for your discussion of apparent duplication. I quite agree with you. Things that look like duplication very many times are not, and we are very happy that you said that things that look alike not necessarily are alike upon examination of them.

Come again. We appreciate hearing from you.

Dr. Gregor, professor of physical chemistry and director of the Ion Exchange Laboratory, Polytechnic Institute of Brooklyn, is our next witness.

STATEMENT OF DR. HARRY P. GREGOR, PROFESSOR OF CHEMISTRY AND DIRECTOR OF THE ION EXCHANGE LABORATORIES, POLY- TECHNIC INSTITUTE OF BROOKLYN

Dr. GREGOR. Mr. Chairman, gentlemen, I am professor of physical chemistry at the Polytechnic Institute at Brooklyn, and I want to

thank you for allowing me to present this statement before the committee. I have a prepared statement.

Senator ANDERSON. Go right ahead and read it, and interpolate as you wish.

Dr. GREGOR. I would rather speak extemporaneously.

Senator ANDERSON. We will include your statement in full at this point and you may proceed as you wish.

(The statement referred to follows:)

STATEMENT OF DR. HARRY P. GREGOR, PROFESSOR OF PHYSICAL CHEMISTRY, THE POLYTECHNIC INSTITUTE OF BROOKLYN

I am privileged indeed to present this statement before the Senate Committee on Interior and Insular Affairs in support of S. 22, the water resources research bill. I want to lay particular emphasis upon the fact that research talent and facilities, both of which are available, can be brought to bear upon the problems of natural water resources only through the full implementation of title 2, as stated in the original Senate bill 2 of the 88th Congress.

My professional interest in water resources stems from my early research work while a graduate student at the University of Minnesota, where, under the guidance of Prof. K. Sollner, I prepared the first permselective ion-exchange membranes. The possible applicability of these membranes to desalination did not enter into my mind at that time. This research was pure and basic, aimed solely at expanding our total knowledge; it was of interest at that time to but a few laboratories throughout the world. Today our work on vastly more improved and complex membrane systems stems from this basic attitude and approach, but our work is also motivated by the extreme practical importance of these membranes.

I have had many opportunities to serve my Government: supervising research projects and grants at the Polytechnic Institute; serving as a "core" member of the National Academy of Sciences-National Research Council Woods Hole Committee on Desalination; and more recently serving as a member of the Water Resources Research Council which met at the Brookings Institute recently.

The purposes of the water resources research bill make particularly good sense to me. The Congress has already authorized substantial programs of research on water desalination and renovation, and in these two areas I think we are making good progress. Progress is not spectacular because this is an old and most difficult problem; difficult because we must produce pure water at a cost which is negligible compared with the cost of almost every other known chemical product. These research programs are, by their enabling legislation, necessarily restricted to the study and employment of certain techniques. The broader charter of the water resources research bill will remove these constraints and make possible truly interdisciplinary studies, employing the talents of diverse parts of a university. For example, by the modification of existing technology it is my feeling that we can considerably decrease the amount of irrigation water now needed in many water-poor regions of the United States. But such an attack, however, requires a team which includes agronomists, polymer chemists, and engineers. I would like to have appended to this testimony a recent letter of mine to the editor of the New York Times on this subject, published on June 30, 1964.

At the present time, only land-grant colleges have broad Federal support for work on these national water resources problems. I teach at a private, technical university; one which derives its major support from tuition and from sponsored research for specific projects from governmental agencies. I am proud of our contributions relating to water resources. A significant part of the basic research carried out in this country on membrane phenomena is done within the laboratories of the Polytechnic Institute. We make a number of different kinds of membranes and study their properties in the chemistry department, and in the chemical engineering department we study the application of membrane processes ranging from desalination to their use in artificial kidneys.

We have in the institute many outstanding scientists and engineers who could contribute substantially to this major, national problem were they brought into it. For example, we have an internationally known Polymer Research Institute, where outstanding research and development on plastics is conducted. Not only must this available staff be supported in the water resources problem areas but, what is more important, this will attract graduate students to this research.

Students have a natural propensity to gravitate in their research work toward popular, well-funded fields; such as, atomic energy, molecular biology, and space sciences.

The water resources research bill will allow private institutions to encourage graduate student interest in water resources problems. This bill will not only provide the necessary hands and minds for the solution of these problems; of greater consequence, it will develop scientists and engineers oriented toward problems of water resources.

I want to thank this committee for the opportunity of presenting my views.

Dr. GREGOR. I am here to lay particular emphasis on the fact that research facilities and talents which are available today can be brought to bear on this water resources problem only through the full implementation of title II as was stated in the original bill, S. 2 of the 88th Congress. I have been interested in water resources since I was a graduate student at the University of Minnesota under Professor Sollner, because it was there I prepared the first permselective ion-exchange membranes. This was my graduate research and at the time, of course, I knew nothing about their applicability.

These were new systems and I was not particularly interested in applications, and this was research that I imagine could be called very pure and very basic because it was simply done for the purpose of expanding our knowledge.

We had no practical application in mind, and it was so pure that only a few laboratories throughout the world were interested in it.

We are still doing work on membranes but now, of course, many laboratories throughout the world are very much interested in this. And I think that the membrane processes seem to be some of the most promising ones for desalinization, renovation, and other purposes.

As a consequence of my research in membrane phenomena, I have been adviser to several agencies of the Government. We have a number of projects and grants in various agencies of the Government. I have served on a number of committees. I was a member of the National Academy of Sciences, the National Research Council, the Woods Hole Committee that wrote the report on desalinization. More recently I was at the Water Resources Research Council meeting at the Brookings Institute.

I have examined this bill, and the purposes of the water resources research bill make particularly good sense to me. We already have substantial programs on research in desalinization and renovation and other areas. I think the progress we are making is good. It certainly is not spectacular. It is an old and extremely difficult problem, because of the economic limitations; that is, you must produce a chemical product; namely, pure water, at a cost that is fantastically low, if compared with the cost of almost any other chemical.

This, of course, makes it so difficult. The research programs we have already underway are necessarily restricted by the enabling legislation to certain techniques and certain areas. The broader charter of the research bill will remove these restraints and allow what is known today as interdisciplinary study. By that means, people from all different parts of the university participate in the same problem area.

An example which I would like to cite is my feeling that if we use these interdisciplinary talents we can solve some of the problems much more expeditiously. For example, I think we can reduce the

amount of irrigation water needed in many parts of the United States simply by having a team going from agronomists to polymer chemists, engineers, and so forth, looking at the problem. I wrote a long letter to the editor of the New York Times recently and it is appended to my testimony, and may I ask that it be included in the record.

Senator ANDERSON. It will be so included.
(The letter referred to follows:)

[From the New York Times, June 20, 1964]

TO PURIFY WATER

USE OF NEW TECHNOLOGY URGED IN IRRIGATION PRACTICES

The writer is professor of chemistry at the Polytechnic Institute of Brooklyn. He participated in writing the 1961 National Academy of Sciences-National Research Council Report on Desalination.

TO THE EDITOR:

Your June 17 editorial "A Problem With Mexico" makes reference to excessive salt in the runoff from American irrigation projects which draw slightly brackish but usable water from the Colorado River (at 850 p.p.m., or parts per million), use it and then dump a saline product at 3,000 p.p.m. into water used by Mexican farmers. At 1,000 p.p.m. water is barely potable; 3,000 p.p.m. water is toxic to crops. Your editorial emphasizes the potentially dangerous political consequences of our contamination of water pledged by treaty to Mexico.

The Southwest possesses wonderfully fertile soil but woefully inadequate water resources. A truly practical solution to this problem requires far more than additional canals to distribute already over-allocated irrigation water.

Our new water technology can make such efficient use of water now available that we can supply our own and Mexico's needs amply. We must cease employing ancient irrigation practices and use technology available today.

CONCENTRATIONS OF SALT

The problem of excessive salinity arises primarily because almost all irrigation water contains appreciable concentrations of salt. When crops are irrigated, a significant portion (about one-third) of the water is evaporated from the surface of the soil, leaving behind a salt crust. Much of the remaining water is lost to the subsoil.

Since this concentrated salt on the surface of the soil is toxic to most plants, the farmer is obliged to overirrigate to keep washing the accumulated salt down into the subsoil.

The price of most irrigation waters varies from 3 to 5 cents per 1,000 gallons; these also contain an appreciable salt content. Modern electrodialytic and ion-exchange desalting processes enable us to reduce salt contents down to negligible levels of 1 to 2 p.p.m. at a cost of about 10 cents per 1,000 gallons of 1,000 p.p.m. water.

With truly desalted water, the need for overirrigation vanishes, and 2 out of every 3 gallons now used can be saved.

The farmer can effect additional, substantial water savings by laying down beneath the surface soil a water-impervious coating. This task appears formidable, but with modern technology it is low in cost and highly practical. Water requirements are reduced thereby by an additional factor of one-third of the truly desalted water.

SAVINGS POSSIBLE

In highly arid regions, further savings of water can be achieved by placing layers of plastic between plant rows or by spraying with substances that retard evaporation there. An additional one-third of desalted water can thus be saved. An additional amount can be saved by treatment of plants with substances which appear to control opening and closing of stomata, thus reducing transpiration. Thus, we can reduce water demand from 3 volumes to 1 by desalting, and down to 0.4 or even to 0.1 volumes by additional procedures.

Many areas of the Southwest could be transformed from water-poor to water-sufficient regions by this simple expedient of purifying already usable water. Even sea water, when desalted at a cost which is about \$1 per 1,000 gallons today, could be used for agriculture with this new methodology.

The United States, through its Office of Saline Water of the Department of Interior, is eminently equipped to lead the assault along these lines. The research has been done. All that is required is a sensible approach, unhampered by traditional practices.

HARRY P. GREGOR.

LEONIA, N.J., June 18, 1964.

Dr. GREGOR. In it, I point out rather briefly that if one alters the techniques of irrigation and at the same time uses desalinization methods that are not very different from those available today, that we can drastically, I believe, cut down the need for the irrigation water.

Now, at the present time, only land-grant colleges have this broad Federal support for this kind of interdisciplinary research. I teach at a private university, a technical university, and it derives its major support from Government research projects.

We are very proud of the many contributions we have already made to the water resources problem. In our laboratories we do a significant part of basic research in membranes, making them, studying their properties, and in the chemical engineering departments, in using them. We have a broad range of objects all the way from desalinization to their possible use in artificial kidneys.

Of course, we have at the university many other outstanding scientists and engineers who could contribute substantially to this problem if they could be brought into it.

For example, we have an internationally famous polymer research institute where a substantial part of the basic research in polymers and plastics in this country has been done.

I think a staff would be supported by the water resources research bill. More important, this kind of staff will attract graduate students, graduates who gravitate in their research work toward popular, well-funded fields such as atomic energy, molecular biology, and space sciences.

It is true that it is hard to get a graduate student to warm up a test tube without a Federal fellowship of one sort or another. The water resources research bill will allow graduate students to continue their interest in water resources problems. This will provide the necessary hands and minds on the part of the graduate students on the needs for these problems and I think more important, it will develop scientists and engineers who are oriented toward these problems.

Thank you very much for the opportunity and for giving me the time to express my views.

Senator ANDERSON. The subcommittee appreciates your presentation here today. When we have somebody here who can say, "I prepared the first permselective ion-exchange membranes," we have somebody here to listen to.

I am interested in this letter to the Times, because my attention was called to it some time ago in connection with our problems with Mexico. I do not necessarily agree with all the things you attribute to the problems with Mexico. Nevertheless, we do have a problem, and we are trying our best to solve it.

You have an interesting point here when you point out the savings possible if it were not necessary to wash out these salts. Everybody who does irrigate, I think, is aware of the problem.

Do you have some questions, Senator?

Senator JORDAN. No, thank you.

Senator ANDERSON. Thank you very much for coming here, and please keep us on your correspondence list. Write to us when you think we need some help and tell us what you are thinking about, because we are going to need all the suggestions we can have from persons like you.

Dr. GREGOR. That is very kind of you. Thank you.

Senator ANDERSON. Dr. Wolman.

STATEMENT OF DR. M. G. WOLMAN, JOHNS HOPKINS UNIVERSITY, UNIVERSITIES COUNCIL ON WATER RESOURCES

Dr. WOLMAN. Mr. Chairman, I am here today as a representative of the Universities Council on Water Resources, and inasmuch as I am pinch-hitting in a way, I was called in at a point where I did not have time nor the facilities at Johns Hopkins University to reproduce some copies of my testimony. I can offer you, for the purposes of following it, a very poor draft here, but it might be useful.

Senator ANDERSON. You go right ahead.

Dr. WOLMAN. My name is M. Gordon Wolman, and I am professor of geography at Johns Hopkins. I am appearing as a member of the executive board of the Universities Council on Water Resources as a substitute for the chairman, Prof. D. F. Peterson, of Utah State University, who is in Morocco and unable to attend at the present time.

The Universities Council on Water Resources is an association of universities in the United States established to encourage graduate education and research in water resources. Originally the Universities Council on Hydrology, membership has grown from 10 universities in November 1962 to 38 in July 1964 and present membership in the Universities Council on Water Resources includes 44 universities, as well as 4 foreign universities who are affiliates.

At its meeting in Denver on June 16, 1964, the Universities Council on Hydrology passed a resolution on the Water Resources Research Act. As this resolution was directly related to Senate bill 22—S. 2, at the time, now S. 22. I would like to read the resolution since I am speaking for the organization at the present time. I will append some remarks to it at the conclusion.

Whereas the legislation embodied in the proposed Water Resources Research Act is of major importance to national programs in water resources development and to programs of evaluation and research in this field; and

Whereas the Universities Council on Hydrology (UCOH) represents 38 universities in the United States interested in education in water resources fields; and

Whereas at its meeting on June 16, 1964, UCOH endorsed its transformation to the Universities Council on Water Resources in order to include the full spectrum of disciplines interested in water resources; and

Whereas it is a principle of overriding importance that all centers of excellence in water resources should be permitted to contribute without restriction to the activities under this act in order that the full manpower resources of the country be brought to bear on this important program: Be it, therefore,

Resolved, That the sense of title II of the Senate version is essential to the purposes of this act; and be it further

Resolved, That, to the same end and in order to achieve maximum effectiveness, the widest possible latitude on the part of the individual States in the designation of institutional responsibility for their water resources programs be encouraged. We believe the Senate version (sec. 100) best achieves this goal; on the other hand, the provision of the House version (sec. 100) encouraging cooperative action between established water resources institutes or centers and other institutions within each State is important. Both concepts should be retained; and be it further

Resolved, That UCOH strongly endorses sections 204 and 205 of the House version placing responsibility for cataloging and coordination of water resources research in the Office of the President; and be it further

Resolved, That with responsibility for coordination and review firmly fixed, and mindful of the fact that Congress may review and legislate further at any time, we believe that the 10-year limitation of the House version (sec. 100) is unnecessarily restrictive and may discourage long-term investment by the States in facilities and manpower. We urge its deletion; and be it further

Resolved, That because of the urgency and importance of the objectives of the act, we believe that the administrative function should be placed at the level of the Office of the Secretary of the Interior.

Now, obviously, some of these elements are redundant, Mr. Chairman, in view of the present, but I think the critical issue here rests with the first resolution, that which is that it is the sense of the title II of the Senate version is essential to the purposes of the act. And that this is what is appropriate here to S. 22.

Senator ANDERSON. By that do you mean both the provision as to the funds for private organizations and the fact that Congress should not review?

Dr. WOLMAN. Yes, sir; but I think the emphasis was particularly here, and here speaking again for an organization I am a little bit cautious about extending beyond the language, but I would say that the emphasis was primarily on the distribution of centers of excellence on the special talents of a wide variety of people and research and perhaps less direct concern on our part with the question of review.

I presume that we would rest that more directly in the hands of a critical evaluation of legal and other aspects.

Senator ANDERSON. My own personal view at the time was that if responsible officials had complete freedom to select individuals and organizations and associations and institutes, such selections might be made on a more scientific and long-range basis if it were not necessary to come back to Congress for approval.

Dr. WOLMAN. What I would like to do is separate myself into two people. I would like to add several items for the record and speak very, very briefly from a personal point of view as a scientist interested in this area.

May I do that?

Senator ANDERSON. We will be glad to have your testimony both ways.

Dr. WOLMAN. What I would like to introduce in the record is the membership list of the Universities Council on Hydrology, as of June 1964 that is, those who endorsed the resolution, per se.

Senator ANDERSON. Without objection, it is so ordered.

(The list referred to follows:)

UNIVERSITIES COUNCIL ON HYDROLOGY

MEMBER UNIVERSITIES, JUNE 1964

University of Arizona, Tucson, Ariz.
 Auburn University, Auburn, Ala.
 University of California, Berkeley, Calif.
 University of California, Davis, Calif.
 University of California, Los Angeles, Calif.
 University of California, Riverside, Calif.
 California Institute of Technology, Pasadena, Calif.
 University of Chicago, Chicago, Ill.
 Colorado State University, Fort Collins, Colo.
 Cornell University, Ithaca, N.Y.
 Georgia Institute of Technology, Atlanta, Ga.
 University of Idaho, Moscow, Idaho.
 University of Illinois, Urbana, Ill.
 Indiana University, Bloomington, Ind.
 University of Iowa, Iowa City, Iowa.
 Iowa State University, Ames, Iowa.
 Johns Hopkins University, Baltimore, Md.
 University of Kansas, Lawrence, Kans.
 Massachusetts Institute of Technology, Cambridge, Mass.
 University of Michigan, Ann Arbor, Mich.
 Michigan State University, East Lansing, Mich.
 University of Minnesota, Minneapolis, Minn.
 University of Nevada, Reno, Nev.
 University of New Mexico, Albuquerque, N. Mex.
 New Mexico State University, University Park, N. Mex.
 Pennsylvania State University, University Park, Pa.
 Princeton University, Princeton, N.J.
 Purdue University, Lafayette, Ind.
 University of Southern California, Los Angeles, Calif.
 Stanford University, Stanford, Calif.
 University of Texas, Austin, Tex.
 Texas A. & M., College Station, Tex.
 Texas Technological College, Lubbock, Tex.
 Utah State University, Logan, Utah
 Virginia Polytechnic Institute, Blacksburg, Va.
 Washington State University, Pullman, Wash.
 University of Washington, Seattle, Wash.
 University of Wisconsin, Madison, Wis.

FOREIGN UNIVERSITIES WITH AFFILIATE STATUS IN UCOH

University of Alberta, Edmonton, Alberta, Canada.
 University of New South Wales, Broadway, Sydney, New South Wales, Australia.
 University of Saskatchewan, Saskatoon, Canada.

Dr. WOLMAN. I would like to introduce in the record the universities council present roster. What we did between June and now was to include a broader spectrum of university participation beyond the aspects of hydrology, to include legal, social, and other parts of the university environment. In other words, we have expanded the scope of the program.

As I mentioned, there are 40 something universities involved, and 4 foreign affiliates.

This is quite a large group. I am introducing into the record not only the membership list, but the delegates to the council from the individual universities, and I think if you look these over, you will see the

breadth of interest that Mr. Agnew referred to earlier ranging from agricultural economics to chemistry, to botany, to geography, to agronomy, and so on. I think the roster itself is a better description than anything I could offer of the true breadth of interest in the Universities Council on Water Resources.

This breadth of interest includes not only the specialists, but also includes the breadth of universities, both land-grant and private universities in all of the States. And these then are the ingredients of my testimony I think most appropriate directly to the council itself.

I would like to add, if I may now, some very brief personal observations on this.

I happen to be, of course, from a private university which also has a long, I would say 20 something year, history of interest in the area of water resources. It happens that in the State of Maryland the water resources interests are divided between the universities. At the University of Maryland there is a very strong program and has been for many years in marine aspects, biological aspects of the environment.

At Johns Hopkins there has been a long concern with sanitary engineering, problems of pollution and a 10- to 15-year project concerned with urban hydrology and massive problems of design of urban drainage systems.

Looking back on the work that has been done in various institutions in the United States, I think you would find that there are a number of non-land-grant institutions which for reasons not explainable by me have a long continuing interest in the water resources field. Stanford University, for example, California Tech, the University of California Technology, the University of Chicago, the work of Professor White and his group there on flood plains which has already been taken cognizance of by the Congress, Harvard University, MIT, Johns Hopkins, and a number of others have had a continuing interest on a fundamental basis with problems in water resources.

I think that we believe as individuals that the sponsorship of research in a truly inquiring fashion does require a distribution system which, if not handled with some care, can lead to duplication or repetition, but, on the other hand, does really require, if new ideas are to come about, the broadest possible spectrum of views as Professor Gregor said earlier in the approach to the problem.

If the problem is really difficult, it is usually very difficult for somebody else to set up a nice scheme for the obvious solution of the problem. If it was that obvious, the chances are that many of the important ones would have been solved before. They require new turns of mind, new twists of mind, and the spread of some of the available funds for research among a variety of people. This is a personal opinion only. I think it is likely to lead to challenging new ideas which are really essential in the intent of Congress in this matter.

I would like to leave it there. I would be happy to answer any questions.

Senator ANDERSON. It has been a stimulating discussion. I appreciate it very much.

The second list you mentioned will be included in the record at this point.

(The list referred to follows:)

Universities council on water resources, October 30, 1964

University	Delegates	Alternates
University of Arizona, Tucson, Ariz.	J. W. Harshbarger, head, department of geology. M. M. Kelso, department of agricultural economics.	E. M. Laursen, head, department of civil engineering. A. L. McComb, head, department of watershed management.
Auburn University, Auburn, Ala.	W. S. Bailey, acting director, water resources research institute. (Additional delegate to be named.)	
University of California, Berkeley, Calif.	D. K. Todd, department of civil engineering. S. V. Wantrup, department of agricultural economics	P. J. Zinke, school of forestry. E. A. Pearson, hydraulic and sanitary engineering.
University of California, Davis, Calif.	V. H. Scott, chairman, department of irrigation. Charles Hardin, department of political science.	R. H. Burgy, irrigation.
University of California, Los Angeles, Calif.	W. A. Hall, director, water resources center. Ernest Englebert, department of political science.	
University of California, Riverside, Calif.	C. W. McKell, department of agronomy. H. P. Bailey, department of geography.	N. T. Coleman, department of soils and plant nutrition.
California Institute of Technology, Pasadena, Calif.	N. H. Brooks, department of civil engineering. Jack E. McKee, department of environmental health engineering.	
University of Chicago, Chicago, Ill.	G. F. White, department of geography. H. R. Byers, department of geophysical sciences.	
Clemson University, Clemson, S.C.	L. G. Rich, dean, college of engineering. W. H. Wiley, dean, college of agricultural and biological sciences.	H. L. Hunter, college of arts and sciences. A. W. Snell, department of agricultural engineering.
Colorado State University, Fort Collins, Colo.	D. B. Simons, chief, civil engineering section. Stephen Smith, chairman, department of economics.	R. A. Schleusener, department of civil engineering. P. O. Foss, department of political science.
Cornell University, Ithaca, N.Y.	L. B. Dworsky, director, water resources center. David Allec, Department of agricultural economics.	L. S. Hamilton, department of conservation.
Georgia Institute of Technology, Atlanta, Ga.	C. E. Kindsvater, director, water resources center. R. S. Ingols, director applied biology.	H. K. Menbinick, school of architecture. W. M. Snyder, school of civil engineering.
University of Idaho, Moscow, Idaho.	C. C. Warnick, department of engineering. W. E. Folz, Department of agricultural engineering.	G. L. Corey, agricultural engineering.
University of Illinois, Urbana, Ill.	V. T. Chow, department of civil engineering. John Cribbet, college of law.	
Indiana University, Bloomington, Ind.	A. F. Agnew, chairman, water resources research center. J. W. Milliman, department of business administration.	Shelby Gerking, college of arts and sciences. Reynold Carlson.
University of Iowa, Iowa City, Iowa.	J. W. Howe, department of mechanics and hydraulics. H. S. Smith, department of civil engineering.	H. H. McCarty, department of geography. A. C. Tester, department of geology.
Iowa State University, Ames, Iowa.	Don Kirkham, department of agronomy. H. P. Johnson, department of agricultural engineering.	E. R. Baumann, department of civil engineering.
Johns Hopkins University, Baltimore, Md.	M. G. Wolman, department of geography. J. C. Geyer, chairman, department of sanitary engineering and water resources.	
University of Kansas, Lawrence, Kans.	R. L. Smith, department of civil engineering. W. J. Argersinger, department of chemistry.	
Massachusetts Institute of Technology, Cambridge, Mass.	P. S. Eagleson, department of civil engineering. R. M. Solow, department of economics and social science.	

Universities council on water resources, Oct. 30, 1964—Continued

University	Delegates	Alternates
University of Michigan, Ann Arbor, Mich.	E. F. Brater, department of hydraulic engineering. L. E. Craine, natural resources----	Robert Zahner, department of forestry. Ayers Brinser, school of natural resources.
Michigan State University, East Lansing, Mich.	L. L. Quill, director, institute of water research. E. H. Kidder, department of agricultural engineering.	W. J. Hinz, department of geology. Raleigh Barlowe, chairman, department of resource development.
University of Minnesota, Minneapolis, Minn.	Wm. C. Walton, school of earth sciences. C. E. Bowers, St. Anthony Falls Hydraulic Laboratory, Mississippi River at 3d Ave. SE.	
University of Nevada, Reno, Nev.	G. B. Maxey, desert research institute. Jean B. Wyeott-----	Richard G. Oreutt, department of civil engineering. Clarence M. Skau.
University of New Mexico, Albuquerque, N. Mex.	B. T. Bower, department of civil engineer.	
New Mexico State University, University Park, N. Mex.	A. E. Utton, school of law----- H. R. Stucky, department of agricultural, engineering and agricultural business. W. Viessman, department of civil engineer.	
Ohio State University, Columbus, Ohio.	G. P. Hanna, Jr., department of civil engineering. G. O. Schwab, department of agricultural engineering.	
Pennsylvania State University, University Park, Pa.	J. C. Frey, director, institute of research on land and water resources. W. E. Sopper, department of forestry.	R. E. Parizek, department of geology. B. A. Whisler, department of civil engineering.
Princeton University, Princeton, N.J.		
Purdue University, Lafayette, Ind.	Dale Swartzendruber, department of agronomy. J. W. Delleur, school of civil engineering.	
University of South California, Los Angeles, Calif.	S. Butler, department of civil engineering. C. Q. Christol, chairman, department of political science and international law.	R. H. Merriam, department of geology. Aurelius Morgner, chairman, department of economics.
Stanford University, Stanford, Calif.	Rolf Eliassen, department of civil engineering.	S. N. Davis, department of geology.
University of Texas, Austin, Tex...	E. F. Gloyna, department of civil engineering. W. L. Moore, department of civil engineering.	H. C. Bold, department of botany. C. W. Johnson, department of law. J. H. Mackin, department of geology. J. R. Stockton, department of business statistics.
Texas A. & M. University, College Station, Tex.	E. T. Smerdon, department of agricultural engineering. K. R. Tefertiller, department of agriculture economics.	W. B. Davis, department of civil engineering. Vance Moyer, department of oceanography and meteorology.
Texas Technological College, Lubbock, Tex.	Keith Marmon, school of engineering. Herb Grubb, department of agriculture economics.	
Utah State University, Logan, Utah.	D. F. Peterson, dean, college of engineering. B. D. Gardner, department of agriculture economics.	Joel Fletcher, engineering experiment station, department of civil irrigation engineering.
Virginia Polytechnic Institute Blacksburg, Va.	J. M. Wiggert, department of civil engineering. Byron Cooper, head, department of geology.	H. M. Morris, department of civil engineering.
Washington State University, Pullman, Wash.	E. R. Tinney, division of industrial research. Millard Mastay, department of economics.	Walter Gardner, department of agronomy.
University of Washington, Seattle, Wash.	T. H. Campbell, department of civil engineering. J. A. Crutchfield, department of economics.	
University of Wisconsin, Madison, Wis.	A. T. Lenz, department of civil engineering. J. H. Beuscher.	

ADDITIONS TO UCOWR MEMBERSHIP AND AFFILIATES SINCE OCTOBER 30, 1964,
LISTING

Members:

University of Colorado
University of Hawaii
University of Oklahoma
University of Missouri

Affiliate:

International Course in Hydraulic Engineering

Senator ANDERSON. Senator Jordan.

Senator JORDAN. No questions.

Senator ANDERSON. Thank you very much for coming. I will extend the invitation to you; if you have ideas, do not hesitate to send them in to us. We need guidance in this field, and we need all the help we can get.

Mr. Fricke.

STATEMENT OF MILTON FRICKE, OF PAPILLION, NEBR., CHAIRMAN, WATER RESOURCES COMMITTEE, NATIONAL ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS; ACCOMPANIED BY PHILIP M. GLICK, GENERAL COUNSEL, NATIONAL ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS

Mr. FRICKE. Mr. Chairman, I am chairman of the Water Resources Committee of the National Association of Soil and Water Conservation Districts.

Just a little aside here: this, in the past, has been the Watershed and Water Resources Committee. The problems that come up in watersheds have forced us, or caused us, to drop the watersheds and go to water resources as a committee, because they are so great and reach far beyond these things.

We testified for S. 2 and are glad that much of it did get passed. We are now here for Senate bill 22.

I represent 2,975 conservation districts across the United States, Puerto Rico, and the Virgin Islands. From here, I will read directly from the notes.

NACD supported passage of S. 2 for several reasons:

First, we believe that research is a most promising and necessary element in the solution of America's water problems and requires national support.

Second, we approve of the investment of larger shares of public funds in the advancement of comprehensive research in this field.

Third, we believe that research of the kind needed should supplement, rather than supplant, efforts already underway in private and public institutions across the Nation.

And, fourth, we are convinced that water resources research should be conducted by a broad variety of organizations each contributing particular talents, skills, and facilities.

The Water Resources Research Act as it was enacted is eminently satisfactory on the first three of these counts. On the fourth, however, we feel that it is inadequate; that it does not give sufficient emphasis to the conduct of research by universities, foundations, and agencies other than land-grant universities. Such emphasis was given in the original title II of S. 2.

For this reason, the governing body of our association—the NACD council which represents all of our State associations and individual conservation districts—took action at our annual convention in Portland, Oreg., last month, supporting passage of S. 22 which is now before your subcommittee. In its action, the council states:

The Water Resources Research Act of 1964 holds genuine promise of contributing substantially to the research and knowledge which are vital to sound progress with the conservation, utilization, and development of the Nation's water resources. While we concur with the general purpose of title II of the act, as adopted, we believe it is unduly restrictive and, indeed, may hamper accomplishment of the intended purposes.

We believe that the program as enacted should be expanded as proposed in the original Senate bill to enlist all centers of competence in such work.

There are three major considerations which we believe justify the passage of S. 22.

First. Since the inception of congressional action to expand water resources research through support of this general kind, there has been an enormous increase in national awareness of the problems caused by population growth, industrial development, urbanization, and the consequent expansion of water use. For this reason, there is growing support for research into the technology of weather modification, saline water conversion, the use and management of water supplies, and other factors involved in water development and utilization that offer the only hope of meeting the water requirements of many areas of the Nation in the present generation, and of the Nation as a whole in another 35 to 50 years.

In the face of this growing concern, we cannot afford to restrict our efforts to one group of research agencies or to provide inadequate funds to advance such research.

Second. A great deal of essential study needs to be prosecuted in fields which have not been explored sufficiently in the past. These areas of concern often relate to the nonphysical aspects of water development and management which are just as important as the physical aspects. One topic of this kind urgently needing investigation involves the efficiency and propriety of the organizational, managerial, and administrative arrangements that exist in the United States for the improvement of water supplies, the construction of water facilities, and the operation of works of improvement on a multiple-purpose basis.

The Federal Government's regulatory authority in this field is sharply limited. State authority, on the other hand, is extensive. Yet, in many instances, the agency best able to coordinate such efforts is local or regional in nature. There is undoubtedly a proper role in these matters for all levels of government, but the proper role and the necessary administrative arrangements that would be required to promote beneficial balance need careful exploration.

Our point here is that, in addition to the institutes being established at the land-grant universities under title I of the act, there are a host of other educational and research organizations, including universities, foundations, and other private and public bodies, which are eminently qualified to carry on research of this kind as well as other kinds of water research. It appears to us that the present title II unnecessarily and arbitrarily restricts the full participation of this whole array of organizations in the expanded research effort even though they have the interest, capabilities, and facilities that would allow them to make an important contribution.

The more groups and agencies that are working on these problems—general and particular—the sooner we will get results. The passage of S. 22 would allow a greater number and variety of institutions to participate in this endeavor.

Third. Under the Water Resources Research Act, as enacted, there will undoubtedly be pressure from eligible institutions to encourage equitable geographical distribution of research grants under the present title II. If the money available is limited to the funds presently authorized under the act, that is, \$1 million per year, it is immediately evident that there is a risk that no one project will be financed adequately. The result will be to emphasize small projects at the expense of those of a more significant kind; and the funds, in effect, will be in danger of being frittered away.

It is sound economy to increase funds available under title II to the contemplated level of \$10 million which seems, in our opinion, the minimum necessary to support the kind of work which needs to be done.

In summary, our conviction is that the Nation—as well as our constituent conservation districts across the country—will benefit greatly from the Water Resources Research Act of 1964. But the benefits will be greater, and the work of higher total quality, if S. 22 is passed in order that all institutions capable of contributing be utilized fully, that comprehensive and nonphysical as well as particular and physical research be accomplished, and that the funds available for this work be utilized efficiently in the public interest.

We appreciate this opportunity to present the views of the National Association of Soil and Water Conservation Districts to you.

Senator ANDERSON. Thank you, Mr. Fricke. We were particularly happy to have this commendation from a large organization as effective in the field as your organization is. I do hope that all those groups will let the House know also how they feel.

The difficulty arose in the House, not in the Senate the last time.

You point out that since it is only \$1 million a year in total, no one project can be adequately financed. I think that is a very important statement.

Mr. FRICKE. That is what we believe. There are so many big problems we know they need care, and with \$1 million, and dividing it very far it will not amount to enough to do the job, and it is a big job.

Senator ANDERSON. And if a very large project comes up, there ought to be sufficient funds to see it through, which there may not be under the present circumstances?

Mr. FRICKE. That is right. These problems are coming real fast to us now as water supplies seem to be shortening up. The population explosion and other reasons cause a demand for water that amounts to more than we ever dreamed of a few years ago.

The one thing that could come out of this would be a resource of water people who are knowledgeable in these problems as they come up.

Senator ANDERSON. Off the record.

(Discussion off the record.)

Senator ANDERSON. On the record.

Do you have a comment to make, Mr. Glick?

Mr. GLICK. Mr. Chairman, I would like, if the chairman will permit me, to supplement Mr. Fricke's remarks with two brief comments.

Senator ANDERSON. Please identify yourself.

Mr. GLICK. I am Philip M. Glick, and I serve the soil conservation districts of the country and the National Council of Soil and Water Conservation Districts as their legal adviser.

There are only two additional comments I would like to make. The first is that, as this committee well knows, the President and his legal advisers feel that the requirement contained in title II of the present statute that every proposed research project formulated under title II that is about to be approved shall be submitted to the appropriate congressional committees for study and review for a stated period before the research project may be authorized, is unconstitutional.

We are very much afraid, therefore, in the soil conservation district program, that if that provision remains in the law, as it is today, and is not removed from the statute, as S. 22 would do, that the net effect would be that title II would be totally inoperative and that even the \$1 million that is now authorized in title II would not be available for research by institutions other than the land-grant colleges.

Senator ANDERSON. If I may break in there, I am not a lawyer, so I speak very freely on these legal points. But I am inclined to agree with you and I talked to the President before he signed the bill and told him if he would sign the bill we would do our best to see that that provision got taken out. It was not in the Senate bill originally. This measure, S. 22, would delete it from the law. If the House insists upon it, there is nothing we can do about that, because the House is the ruler of its own fate.

I quite agree with you that we should not leave this possible deterrent in the law, and expect to get the best results from them.

My feeling is, personally, that very few title II grants will be made until that point is cleared up. I am fully satisfied not only with what President Johnson said, but with what President Eisenhower said in a similar situation. I am glad to have you here in support of this.

Mr. GLICK. Thank you very much, Mr. Chairman. On behalf of the districts we are very happy to hear this. And we do hope the committee in its own report can make clear that the effect of that provision is not only to limit the land-grant colleges in the program, but so long as the President and his legal advisers take the position they do—which I myself as a lawyer, I must say, I concur in, I think they are right—so long as that remains true, title II becomes totally inoperative.

The second point, Mr. Chairman, I would like to make briefly is this: The soil conservation districts of the country have always been interested in watershed stabilization, the control of floods, and in water resource conservation and development. This is so true that there is a wide movement, as the members of this committee well know, now across the Nation to amend the State soil conservation district laws to change the name of the soil conservation districts to soil and water conservation districts.

The work that the districts, 3,000 of them spanning the entire country, have been doing for the last 25 years has convinced us that there is one very important institutional area of study that needs a great deal of future research, and that is this: to determine what

is the proper function or set of functions to be carried on in the area of water conservation and development by the Federal Government. What is the appropriate area to be carried on by the separate State governments? And what is the appropriate area of operation and responsibility to be assigned to local units such as the counties and the soil and water conservation districts?

Now, we are very much concerned that the individual land-grant colleges, focusing as they do on direct problems of agriculture and on the problems of local projects, are not likely to concern themselves with this large problem which is rather political science and public administration in character rather than strictly agricultural, and we hope, therefore, that under title II the National Association of Soil & Water Conservation Districts will be able to encourage a number of other universities and research foundations, that is other than the land-grant colleges, to enter into research in this very important, critical, and difficult problem of the assignment of appropriate responsibilities to Federal, State, and local government levels.

This is why we earnestly support the bill introduced by you, Mr. Chairman.

Thank you very much.

Senator ANDERSON. As sponsor of this legislation, in both the last and in this Congress, I am, of course, heartily in favor of utilizing other schools. I was raised in a State bordering on Iowa. I recognize that people in Iowa have reason to be very proud of the State college at Ames, and also they are proud of the University of Iowa.

Now, to go back to the question about what the President said about legislative interference with an Executive function. We have counsel with us, Stewart French who today is celebrating 15 years of continuous service with this committee, and very good service. We are happy that he has finished those 15 years as capably as he has and he tries to protect me and other members of the committee, because of what I said the President said. I may have misquoted the President a little bit. On signing S. 2 into law, the President said:

Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches.

He did not say the provision is unconstitutional, but did point out that it certainly violated the spirit. As long as the President feels that way about it, as long as the Bureau of the Budget has people who occasionally confer with him, I have great doubts as to how much money is going to be available for putting title II into effect until that particular issue is resolved by Congress and the President.

I appreciate your being here, Mr. Glick, and I hope you will come back and help us from time to time.

Senator Jordan?

Senator JORDAN. No questions.

Mr. FRICKE. May I impose this much, Mr. Chairman. I would like to introduce two gentlemen behind me, Gordon Zimmerman, our executive secretary, and David Unger, the assistant secretary.

Now, as to these things you ask that we do within our limited resources, we will do all we can to be of help.

Senator ANDERSON. You do not have such limited resources because you have thousands and thousands of good farmers who look to the

work you are doing, and that is a pretty fair-sized representation itself.

Mr. GLICK. Two million of them.

Senator ANDERSON. That is certainly a goodly number.

Are there any people here who wanted to be heard? If not, we will conclude this hearing, with the record to be kept open for 10 days so that anyone who wishes to submit a statement or additional material may do so.

The chairman expresses his thanks on behalf of the committee to those people who have testified and testified so capably on this proposal.

Thank you very much.

(Whereupon, at 11:25 a.m. the committee adjourned.)

(Under authority previously granted the following communications were ordered printed:)

THE NATIONAL ASSOCIATION OF SOIL AND
WATER CONSERVATION DISTRICTS,
Washington, D.C., March 4, 1965.

Hon. CLINTON P. ANDERSON,
Chairman, Subcommittee on Irrigation and Reclamation, Senate Committee on Interior and Insular Affairs, Washington, D.C.

DEAR SENATOR ANDERSON: During the hearing on March 3 before the Subcommittee on Irrigation and Reclamation of the Senate Committee on Interior and Insular Affairs on the bill S. 22, designed to amend Public Law 88-379: "An Act to establish water resources research centers, to promote a more adequate national program of water research, and for other purposes;" at which you presided, you invited me to supplement my testimony before the committee with a written opinion on the question of the constitutional validity of the second sentence of section 200 of that act. I am glad to respond to that invitation with this letter.

The second sentence of section 200 of the act reads as follows:

"The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days * * * after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same."

When the President approved this act on July 17, 1964, he issued a statement in which he commented on the provision just quoted, as follows:

"One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants."

I respectfully submit that the provision quoted from section 200 does more than violate "the spirit" of the constitutional requirement of separation of power between the executive and legislative branches. I believe that the provision is invalid under the Constitution of the United States because it does, in fact, violate this constitutional requirement.

If the provision said that the Secretary of the Interior may not proceed with any proposed research grant or contract if either of the two named committees disapproved the proposed action, its constitutional infirmity would be more clear, but the infirmity is still present in the provision as worded in section 200.

In that provision, the Secretary is first required to submit each proposed research grant or contract to the President of the Senate and the Speaker of

the House of Representatives; the proposals must lie before the Senate and House for at least 60 calendar days; and thereafter "no appropriation" may be made "to finance the same" if, within said 60 days, either of the two named committees has disapproved the proposal.

It is undeniable that the Congress may constitutionally refuse to make an appropriation of funds even where the appropriation has been lawfully authorized. This constitutional power of the Congress to withhold an appropriation is, however, so well established that it is clearly not necessary for the Congress expressly to reserve the right to refuse to make an authorized appropriation. The only apparent purpose that this provision can serve, therefore, is to make it possible for a point of order to be made to defeat any appropriation that may be included in an appropriation bill to finance the provisions of the act, in any case where the appropriation would apply to a proposed research grant or contract which the Secretary of the Interior had approved but which either of the name committees had disapproved.

The necessary legal effect of the quoted provision is, therefore, to authorize either of the named committees, by disapproving the proposed action of the Secretary, to set aside the approval of the Secretary of the Interior so long as any Member of the Congress were willing to make a point of order against the proposed appropriation.

The Congress may certainly set aside an executive action of which it disapproves by enacting a statute to that effect, but I submit that the Constitution does not authorize it to set aside an executive action of which a committee of Congress disapproves by making any and every appropriation intended to effectuate that executive action subject to a single Member's point of order by which the Congress itself would be bound. It is my opinion, therefore, that the quoted provision does more than violate the spirit of the constitutional requirement of the separation of power; I am afraid that it violates the requirement itself.

Respectfully submitted.

PHILIP N. GLICK,
General Counsel.

WATER RESOURCES RESEARCH CENTER,
INDIANA UNIVERSITY,
Bloomington, Ind., March 5, 1965.

Hon. CLINTON P. ANDERSON,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.
(Attention Stewart French, chief counsel).

DEAR SENATOR ANDERSON: During the course of testimony in favor of Senate bill S. 22 on March 2-3, 1965, the question of duplication and coordination of research effort was posed to Dr. R. R. Renne, and was discussed by him and later by Dr. Walter Morgan and myself.

Recognizing the need to prevent unnecessary duplication in water research matters, we at Indiana University had called a meeting of the directors of water research centers in the upper Middle West for April 9, 1965, to consider the many problems of information exchange among the research centers, and also between the centers and the State, interstate, and Federal agencies involved in water matters.

When I mentioned this to you at the close of the hearings on March 3, you kindly suggested that I send a copy of the agenda of this forthcoming meeting, for inclusion in the record of the hearings. We are pleased to enclose it herewith, as it bolsters our statements regarding duplication which were given during the hearing.

Again, we wish to commend the 88th Congress on the enactment of Public Law 88-379, and we urge the passage by the 89th Congress in its 1st session of Senate bill S. 22, which will provide a workable title II and will authorize increased title I appropriations that are more adequate to fulfill the great amount of research that needs to be done, as our Nation attempts to solve its water problems.

Sincerely yours,

ALLEN F. AGNEW, *Director.*

AGENDA FOR THE MEETING OF THE DIRECTORS OF THE MIDWEST UNIVERSITY WATER
RESEARCH CENTERS, INDIANA UNIVERSITY, APRIL 9, 1965

- 9:00 a.m.: Introductory remarks.
 9:15 a.m.: Status of water research at the university centers, a 5- to 10-minute statement by each of the 10 directors.
 10:30-10:45 a.m.: Coffee.
 10:45 a.m.: Interuniversity water research—Allen F. Agnew, Indiana University.
 11:05 a.m.: University and nonuniversity water research—J. I. Bregman, Illinois Institute of Technology.
 11:25 a.m.: University water research and the State water administrative or regulatory agency—John E. Mitchell, B. A. Poole, Indiana Department of Conservation; Stream Pollution Control Board.
 11:55 a.m.: University water research and the interstate compact or commission—Edward J. Cleary, ORSANCO.
 12:25 p.m.: Head for lunch.
 12:40-2:15 p.m.: Luncheon—Speaker, R. R. Renne, Director, Office of Water Resources Research, U.S. Department of the Interior: University water research and the Federal agency.
 2:15 p.m.: Head back to the meeting.
 2:30 p.m.: University water research and the UCOWR—J. W. Milliman, Indiana University.
 2:50 p.m.: Additional discussion regarding any of the items discussed thus far.
 3:20 p.m.: Suggested structure to provide for a regular (annual, semiannual?) meeting of this type, rotating among the universities.
 3:50 p.m.: Other items.
 4:00 p.m.: Adjourn.

STATE UNIVERSITY COLLEGE OF FORESTRY,
 SYRACUSE UNIVERSITY,
Syracuse, N.Y., March 2, 1965.

Hon. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: Senate bill 22 authorizing an appreciation of \$5 million in the fiscal year 1966 for title II, section 200, of Public Law 88-379 of the 88th Congress, has come to my attention. As an important State college deeply concerned with watershed management, particularly as it relates to forest lands, and with water pollution and deterioration of watersheds that may result from injudicious logging actions of the forest products industries, we strongly favor this amendment.

Our college is not a part of the land-grant system and hence, is not eligible for direct grants under title I. Several other important forestry schools, notably those in Michigan and Washington, to name but two, are not parts of land-grant institutions and hence, also are ineligible for research funds under title I, yet each is in a position to make substantial contributions to water resource research and management. I am sure your committee is fully aware of the need for research in water, as one of the major renewable resources of our Nation.

Sincerely yours,

HARDY L. SHIRLEY, *Dean.*

NORTHEASTERN UNIVERSITY,
 DEPARTMENT OF CIVIL ENGINEERING,
Boston, Mass., February 24, 1965.

Senator HENRY M. JACKSON,
Chairman, Senate Committee on Interior and Insular Affairs.
Washington, D.C.

DEAR SENATOR JACKSON: At Northeastern University, a privately supported institution, we are very much in favor of passage of S. 22 amending title II of the Water Resources Act of 1964.

We would plan to expand our activities in water resources research if moneys were available for this work. We already carry on very active programs in civil engineering and other subjects bearing on water resources planning both at the undergraduate and graduate levels.

This department alone produces roughly one-third of the civil engineering graduates in the Northeastern United States. Our graduate programs are similarly successful. At present we have 350 undergraduate and about 100 graduate students enrolled in our civil engineering curricular. From past experience about one-half of these enter the field of sanitary engineering or its affiliated areas of professional work. Our cooperative plan of education and our location near the largest centers of consulting engineering in the United States (Boston and New York) makes this institution and its professors keenly aware of problems in hydraulic engineering and related fields as they arise.

Sincerely yours,

ERNEST L. SPENCER,
Professor of Civil Engineering.

APPENDIX

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
November 3, 1964.

UDALL ANNOUNCES PROPOSED PROCEDURES FOR SPEEDING WATER RESOURCES RESEARCH GRANTS

Secretary of the Interior Stewart L. Udall today announced proposed rules that will guide the administration of the new Office of Water Resources Research in its program of assistance to universities and other research entities under the Water Resources Research Act of 1964.

The proposed regulations, said Secretary Udall, are aimed at developing procedures that will speed the allotments of Federal funds to qualified recipients. All States are eligible for an allotment for one research center in each State. The Department has \$1 million available for these allotments to State water research centers or institutes for the current fiscal year. The allotment to each State center is \$75,000 the first year, and the new act provides for larger allotments in succeeding years.

In addition, matching grants are authorized for specific water research projects. The Department has \$250,000 available for this now. The act authorizes appropriations for these matching grants that can grow to \$5 million per year by fiscal year 1969.

In approving the proposed regulations, which appeared in the Federal Register October 29 and which are subject to revision following receipt of comments from the public, which will be accepted for consideration until November 18, 1964, Secretary Udall praised the act as making possible "full engagement of the Nation's intellectual capabilities in meeting the Nation's water problems.

"New and improved means of dealing with water problems of local, State, regional, and national levels will result from enlisting the competence of the universities and other research entities," Secretary Udall added. "Administration of the program should insure that these results are achieved.

"This new program enlarges the tradition of Federal support for non-Federal agency research that provided for cooperative Federal-State agricultural research," he continued. "We have the opportunity and the responsibility for an even wider extension of water resources research cooperatively with all who have competence."

Secretary Udall emphasized also that administration of the program should provide for freedom of research and for recognizing the initiative of the research workers themselves.

Dr. John C. Calhoun, Jr., science adviser to Secretary Udall and Acting Director of the Office of Water Resources Research (OWRR), said the proposed rules and regulations were developed in consultation with persons and organizations experienced in research and water resources administration. These include Federal and State agencies and officials, representatives of the university community and other research organizations, and many others interested in objectives of the act.

"The basic objective of these rules is to get the program started—to make the allotments as quickly as possible consistent with substantial progress in basic and applied research," Dr. Calhoun said.

Dr. Calhoun explained that the proposed rules and regulations are directed primarily to administration of the program, rather than to the subject matter of the research and training it will support. The rules provide information as to eligibility for grants, how applications may be made, the type of information required, what comprises permissible expenditure of funds, frequency of research reports, audits, fiscal and accounting procedures, and other details.

Dr. Calhoun said that, initially, the funds will permit award of grants to water resources research institutes in only 14 States, but that the goal of the program is to reach all States and Puerto Rico. Applications for allotments in the present fiscal year, which ends June 30, 1965, will be received by OWRR at any time. All applications received by December 5, 1964, will be considered in the initial competitive group. The selection and awarding of allotments will be based on an evaluation of the requests.

For the time being, Dr. Calhoun explained, awards will not be made under that section of the act (title II) which provides for arrangements with others than the State institutes. He pointed out that President Johnson, in signing the enabling legislation, was concerned about a requirement of the act that congressional clearance be obtained for such arrangements.

"Although applications for such research projects may be submitted and will be reviewed by the Office of Water Resources Research, no further action will be taken on them until the provision to which the President objects is removed from the act," Dr. Calhoun said.

Dr. Calhoun reemphasized Secretary Udall's statement that this new program can bring to bear on water problems all the research ability of the country. He added that this will greatly strengthen Federal, State, and local efforts to meet the Nation's growing water use requirements.

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History on

P.L. 89-404

WATER RESOURCES RESEARCH

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HEARINGS
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IRRIGATION AND RECLAMATION
OF THE
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
HOUSE OF REPRESENTATIVES
EIGHTY-NINTH CONGRESS
SECOND SESSION
ON
H.R. 3606 and S. 22 and Related Bills
TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM
OF WATER RESEARCH

FEBRUARY 14, 15, AND 18, 1966

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NOTE.—The chairman, Hon. Wayne N. Aspinall, is an ex-officio member of each subcommittee.

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WATER RESOURCES RESEARCH

MONDAY, FEBRUARY 14, 1966

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:50 a.m., in room 1324, Longworth House Office Building, the Honorable Walter Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order, for the consideration of pending bills.

The subcommittee has under consideration this morning S. 22, which has passed the Senate, and the companion House bills, to promote a more adequate national program of water research. This would be accomplished by amending the Water Resources Research Act of 1964, to restore title II as originally proposed.

The members of the committee will recall that in 1964 the committee and the House deleted title II from the legislation. A token title II program was agreed on in the conference and is included in Public Law 88-379. However, the President objected to certain language providing for committee review; and no funds have been requested to implement the title II program. This expanded program calls for Federal financial support of non-Federal research. The legislation authorized the appropriation of \$5 million in the first year of the program, increasing \$1 million annually for 5 years and continuing in the amount of \$10 million thereafter. As I pointed out, the bill S. 22 has already passed the Senate. We have several identical bills introduced in the House, H.R. 3606, by Mr. O'Brien, of New York, and a member of this committee; H.R. 5930, by Mr. Hanley; H.R. 6282, by Mr. Pickle; H.R. 8916, by Mr. Ashley.

Without objection, H.R. 3606 will be considered by the committee and included in the record along with a copy of Public Law 88-379, with the proper reference being made to the other measures pending before the subcommittee, with a copy of S. 22 also included.

We have received a report from the Department of Interior under date of May 28, 1965, over the signature of the Honorable Kenneth Holm, Assistant Secretary of the Interior, which will also be included in the record at this point.

(The documents referred to follow:)

[H.R. 3606, 89th Cong., 1st sess.]

A BILL To promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) Section 200 of Public Law 88-379 of the Eighty-eighth Congress is repealed; and

(b) That there is enacted in lieu thereof the following :

"SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1966, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied."

PUBLIC LAW 88-379, 88TH CONGRESS, S. 2, JULY 17, 1964 (78 STAT. 329)

AN ACT To establish water resources research centers, to promote a more adequate national program of water research, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts" or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiments stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations of water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation

available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions; with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this section shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing

water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 306. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

Approved July 17, 1964.

LEGISLATIVE HISTORY

House reports: No. 1136 (Committee on Interior and Insular Affairs) and No. 1526 (committee of conference).

Senate Report No. 117 (Committee on Interior and Insular Affairs).

Congressional Record:

Volume 109 (1963):

April 22, considered in Senate.

April 23, considered and passed Senate.

Volume 110 (1964):

June 2, considered and passed House, amended.

July 2, House and Senate agreed to conference report.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., May 28, 1965.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives,
Washington, D.C.

DEAR MR. ASPINALL: This responds to your request for the views of the Department of the Interior on H.R. 3606, H.R. 5930, and H.R. 6282, bills "to promote a more adequate national program of water research."

We recommend that one of the bills be enacted.

These bills would amend title II of the Water Resources Research Act of 1964. Under title II of the Water Resources Research Act the Secretary of the Interior is authorized to support a program of research into aspects of water problems related to missions of the Department of the Interior. Appropriations of \$1 million per year for 10 fiscal years commencing with fiscal year 1965 are authorized for the program. Money appropriated pursuant to this authority may be used for grants, contracts, matching or other arrangements with educational institutions (except those at which a water resources research institute is maintained pursuant to title I of this act), private institutions, private firms, or individuals and Government agencies, local, State, and Federal. This act provides that appropriations may be made to finance grants, contracts, and other arrangements only if they are not disapproved by the Senate or House Committees on Interior and Insular Affairs.

These bills would not change the purpose of title II of the Water Resources Research Act, but they would enlarge the scope of the program and remove some limitations from it. The bills would make four important changes in title II.

First, appropriations would be authorized at the level of \$5 million for fiscal year 1966. The authorization would increase by \$1 million annually until the level of \$10 million was reached. The authorized ceiling would remain at \$10 million per year thereafter.

Second, the 10-year limit on the authorization for appropriations to carry out title II would be eliminated.

Third, the prohibition against support of research at educational institutions where there is a title I water resources research institute would be dropped.

Fourth, the provisions for legislative committee review of proposed grants, contracts, and other arrangements would be dropped.

We believe that all four of the changes that these bills would affect are justifiable and would benefit the program. We, therefore, support the bills.

As to the first change, in the short life of the Office of Water Resources Research (established in the Department to administer title II), we have received 36 proposals for research activity into water resource problems affecting the Department's missions. These proposals aggregate \$1,750,000 and come from responsible, qualified individuals and organizations. Many of them would be accepted if it were possible to do so within the limitations of the appropriations available. This outpouring of proposals is particularly striking in view of the fact that appropriations under title II have not yet been made. When the limit of authorized appropriations was established at \$1 million per year it could not be known with certainty what level of activity could be anticipated. In supporting the bill that became the Water Resources Research Act the Department was not in a position to predict what level of response would be stimulated by the act. Experience based on the number of proposals received to date demonstrates that \$1 million per year is inadequate, and suggests that an authorization of \$5 million to support the first year's research program is justified. As the program becomes better known, and as more talent and capacity is developed over the next few years, we expect promising proposals to increase, thus justifying a gradually rising appropriation ceiling to \$10 million per year by 1971.

As for establishing the authorization for appropriation without a finite time limit, at least two points should be made: (1) much of the research that will be undertaken will be of a long-range nature and the prospect of long-term support for it must exist if it is to commence; and (2) water problems will persist and the capacity to analyze and deal with them will grow in the future; this Department's mission will become more important and complex as time goes on and it is reasonable that the program be authorized on a continuing basis.

The third objective of these bills—dropping the prohibition against associating with institutions maintaining water resource research institutes—makes eminent sense. These institutes, and the educational centers, where they are located are likely to be the loci of much of the water resources research capability in the Nation. The Secretary should have the authority to look to that capability to accomplish the purposes of title II. The provision in the bills that support may not be given to research projects otherwise being studied will insure that duplication will not result from dropping this provision of the act.

Fourth, the bills would eliminate the authority of the Committees on Interior and Insular Affairs of the House of Representatives and Senate to bar appropriations to fund research projects proposed to be undertaken pursuant to title II of the act.

The last sentence of section 200, title II, requires that each proposed grant or other arrangement be submitted to the Congress to lie before the Committee on Interior and Insular Affairs of the House of Representatives and Senate for 60 days. Appropriations to finance these grants or other arrangements are permitted under the act only if neither committee disapproves them within the 60-day review period.

In approving the Water Resources Research Act the President made reference to this requirement, stating:

"One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation."

These bills would carry out the President's request.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

KENNETH HOLUM,
Assistant Secretary of the Interior.

[S. 22, 89th Cong., 1st sess.]

AN ACT To promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) section 200 of Public Law 88-379 of the Eighty-eighth Congress is repealed and

(b) That there is enacted in lieu thereof the following :

"SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1966, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with those private firms and individuals whose training, experience and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied."

Passed the Senate March 25, 1965.

Attest :

FELTON M. JOHNSTON,
Secretary.

Mr. ROGERS. Let the record show S. 22 passed the Senate on March 5, 1965, with Senate Report 127.

Several requests have been made by Members to appear and testify this morning. Are any Members of Congress here who desire to testify?

Yes. Mr. Hanley.

Are there any other Members besides Mr. Hanley?

If not, Mr. Hanley, the Chair recognizes you at this time for your testimony.

STATEMENT OF HON. JAMES M. HANLEY, A REPRESENTATIVE IN CONGRESS FROM THE 34TH DISTRICT OF THE STATE OF NEW YORK

Mr. HANLEY. Thank you, Mr. Chairman.

Mr. Chairman and members of the subcommittee, first of all, I want to express my thanks to you for scheduling this hearing and for offering me this opportunity to express my views on what I consider to be a very important legislative matter. My bill, H.R. 5930, is identical to Congressman O'Brien's H.R. 3606. The legislation would repeal section 200 of Public Law 88-379 and substitute in its place a new section 200 to accomplish four purposes. First, it would increase the authorization for title II activities to \$5 million for fiscal year 1966 and provide for a \$1 million annual increment to the authorization until a \$10 million authorization is reached. Second, it would remove the 10-year authorization limit for title II. Third, it would permit educational institutions participating in title I to participate also in title II activities. Fourth, it would remove the provisions for legislative com-

mittee review of proposed grants, contracts, and other arrangements under title II.

This subcommittee will hear expert witnesses from the Department of the Interior and from the educational and scientific community testify as to the merits of this legislation. I would hope that the Department of the Interior can convince the subcommittee that the record of activities under the Water Resources Research Act indicates clearly the feasibility and the importance of opening up title II. Learned educators from around the Nation can tell you what our institutions of higher learning have to offer to the purposes of the Water Resources Research Act.

I am very interested in the promotion of an expanded national program of water research. The Northeastern United States is beginning to learn a lesson which the Southwest has already learned, that we have no inexhaustive supply of water. This lesson was impressed most graphically upon our region last summer. Our cities, our industry, and our agriculture all need clean water. Our expanding population is pressing hard on the resources available for good, water-based recreation.

As you know, title II of the Water Resources Research Act will remain inoperative until Public Law 88-379 is amended. There are hundreds of universities in this Nation which are capable of making significant contributions to the purposes of the act, but they are not land-grant colleges. It was this point which prompted me to introduce H.R. 5930. By limiting participation to land-grant colleges, the Nation is not making full use of the talent which is available elsewhere to promote an adequate national program of water resources research. I believe that the Syracuse area, which I represent, undoubtedly is able to make important contributions to the Nation's storehouse of knowledge and understanding of water resources. Institutions like Syracuse University, the New York State University College of Forestry at Syracuse University, and the Syracuse University Research Corp., possess proven expertise and demonstrated experience to conduct research, investigations, experiments, and the training of scientists in the fields of water and resources related to water. It is my thought that while we are creating and supporting centers of excellence in water resources research, we ought also to take fair advantage of the ones which already exist.

I know that Syracuse University has discussed with the Department of the Interior the feasibility of conducting an interdisciplinary study to determine the values lost through permissive resource destruction. The findings of the project could make a significant contribution to our knowledge of water resources and to our methods of inquiry.

The State University College of Forestry has already established a Water Research Institute for Forest Lands and Industries. Its purpose is to bring the resources of the college in the biological sciences, in chemical engineering including pulp and paper technology, economics, silviculture, and forest land management to bear on the problems of managing water resources. The college would like to have the opportunity to make use of title II funds to help support its work.

The Syracuse University Research Corp. is interested in the availability of title II funds. The corporation has already done much work for the local government, for the State of New York, and for the Federal Government in water resources. It has the ability to draw upon the pool of scientific and technological manpower which exists in the universities in the area.

I shall conclude my remarks by saying that these local institutions have for a long time engaged in the training of professional water resource manpower. Access to funds under title II of the Water Resources Research Act will enable them to continue to draw and hold their share of the highest caliber graduate students.

Thank you very much.

Mr. ROGERS. Thank you, Mr. Hanley, and let the Chair say that I believe this is the first time you have appeared before this subcommittee.

Mr. HANLEY. This is true.

Mr. ROGERS. And I want to express the appreciation of the Chair, and I think I speak for other members of the subcommittee for this excellent statement and the manner in which you have presented it.

The Chair recognizes the gentleman from Colorado, Mr. Aspinall, the chairman of the full committee.

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, I, too, wish to commend our colleague for his statement. It is a short statement and I think he has got his ideas pretty well incorporated therein. Questions which I have will be of a general nature, trying to see just where you find yourself in this research program.

What kind of research, Congressman Hanley, should the Federal Government engage in?

Mr. HANLEY. Forgive me, Mr. Chairman, I didn't hear your question.

The CHAIRMAN. What kind of research activities should the Federal Government engage in or finance?

Mr. HANLEY. This is a very broad aspect field with respect to research, and the Federal Government certainly engages in many areas of endeavor.

The CHAIRMAN. Should it engage in basic research alone, or should it engage in basic research and applied research or both of them? What is your idea as far as spending Federal money is concerned?

Mr. HANLEY. I believe this should be determined by the degree of necessity, and I think we will all agree that we have a great problem with respect to water resources. We should pursue any avenue of research which is going to bring about a hoped-for cure to the problem that now confronts this Nation with respect to availability of water.

The CHAIRMAN. How many individual contracts do you think the Federal Government can and should finance annually in a research program on a matter such as water?

Mr. HANLEY. Well, I look upon the water problem as important perhaps as our space program, and I think that if we can't cultivate the resources we have to allow this Nation the necessary water to provide for the needs of our industry and our economy, then we really can't move in any other direction.

The CHAIRMAN. I am in agreement with that. But I want to get into the record the number of contracts at the present time that are financed by the Federal Government in water research.

Mr. HANLEY. I am not in a position, not being a member of your committee, to answer your statement.

The CHAIRMAN. You made a very fine statement for Syracuse University. Of course your whole pitch is to give the university an opportunity to take part in this program.

Now, would you say that 250 contracts annually or 500 or a thousand or 1,500 or 2,000 would indicate sufficient participation by the Federal Government—that is, average sized contracts?

Mr. HANLEY. In recognition of budgetary restrictions, I think that we should go all out in this particular field. I don't profess to be an expert in this particular area, and I respect the judgment of your very fine committee, and I am sure that you are in a position to ascertain the number of programs that we can engage upon with respect to whatever budgetary restrictions exist. I can only say this: that I would earnestly request that you extend yourselves to the n th degree with respect to any number of programs that might bring about the elimination of this water problem which we are faced with.

The CHAIRMAN. There is a limit, though, isn't there?

Mr. HANLEY. Certainly there is.

The CHAIRMAN. Should that limit be determined by the welfare of the university establishing a new chair or a new activity in the university, or should that limit be determined by the adequacy of the present program or by the limitation of money?

Mr. HANLEY. I don't believe that the limit is to be determined by the welfare of the university and I don't believe that that is the point here this morning. I think the point is that we should take advantage of the professional know-how that exists within these institutions of learning, take advantage of the extent that our budget will allow. We are really not talking in terms of welfare to a particular university. We are talking about the talent that exists within many of the institutions of learning throughout this Nation. That would be somewhat restricted, due to the language of the material that we are discussing here this morning.

My only point is that we should take advantage of this expertise and this know-how that is at our disposal.

The CHAIRMAN. Of course you understand that perhaps equally important to this particular phase of the program is the training of the scientists in the realm of water studies. These two go together. What I have been trying to do is to find out whether or not if you were from some place other than a university area, like the university at Syracuse, whether you would be here for this legislation. That is what I am trying to find out, because there are five or six of our colleagues who have asked to testify and all of them come from university areas.

Mr. HANLEY. Be assured, Mr. Chairman, I am not here simply because I happen to be from an area that has a university.

The CHAIRMAN. You are fortunate to have a good university.

Mr. HANLEY. Yes. This is purely coincidental, believe me, and I have the utmost respect for this particular institution of learning, and

I look upon it as an institution that could contribute so greatly to this cause. But my purpose here this morning is not to defend or submit the potential of this university in this problem. I am here this morning because of my great concern with the problem insofar as the Nation is concerned. I don't speak here in behalf of New York State or Iowa or Montana. I say that we should scan the Nation and take advantage of every opportunity that exists for us in any institution of learning throughout the Nation, and call upon them and support them financially, so that they might in turn assist our Nation in resolving this tremendous problem. I know that you are aware, when we talk, going back to New York State, you are aware of the tremendous problem in New York City. New York City, of course, is completely divorced from the area that I actually represent. But nevertheless I share great concern about the problem that has arisen there, and as we see it right now, we have no real program designed to effect a cure for a problem that can actually take water away from the drinking taps of the people of New York City. So I think that we are faced with a tremendous problem that we are way behind on.

As I say, I have great respect for the space program, but I say that if we don't have the basics such as water, we are really not going to progress in any other field.

The CHAIRMAN. Of course I am not going to take any more time. On this last matter I agree with you 100 percent and I am not in disagreement with you on the other. What bothers me is that we have spent such a small amount in regard to research for water, pure air, and such a large amount on some of the other matters.

On the other hand, may I say to you that there are other avenues to help your situation in New York City far more effective and far more expeditiously than anything that will come out of this program, in my opinion.

Thank you very much.

Mr. ROGERS. Mr. Baring?

Mr. BARING. Mr. Chairman, I have no questions. I want to welcome our colleague before the committee and say that I appreciate your presentation very much.

Mr. HANLEY. Thank you.

Mr. ROGERS. Mr. White?

Mr. WHITE. Thank you very much, Mr. Chairman.

I also wish to welcome my colleague before this committee. I have a couple of questions I would like to propound to you if I may.

On the first page of your explanation of the legislation as introduced, and I assume that it is copied after S. 22—

Mr. HANLEY. Yes.

Mr. WHITE (continuing). "4. It would remove the provisions for legislation committee review proposed grants contracts and other arrangements under title II."

Just why did you propose that in your legislation?

Mr. HANLEY. Because I believe that it could actually hold up a program that I think should be expedited, again on the basis of absolute necessity. I believe that it could deter the speed which is required if we are going to move in the direction of eliminating this great problem.

Mr. WHITE. Are you familiar at all as to why this was placed in the legislation to start with, why it happens to be in the act as it is now written?

Mr. HANLEY. I have to say that I would look upon it as a deterrent to the expedient implementation of the bill.

Mr. WHITE. I assure you that the language in the act and in the previous legislation, that was not the purpose of that inclusion. It has been to try and keep these research programs in focus so that we don't go off in a hundred different directions without any directing discipline here as to what is being done. I think that the chairman of the full committee agrees that the best interest in research and developing the type of things we need in the United States, whether it be in this field or in any other field, has taken the position that rather than have duplication of effort and research heaped upon top of research without any productivity, that it is better to keep some congressional oversight over this research, rather than just turning it loose without any direction. I don't say that this is what happens every time, but experience so far has indicated that this is of some necessity. I think that you should take a look at that before you make the broad statement that it will impede water resource research.

I think that you should also include in your statement, if I were to write your statement, in your next to the last paragraph on the first page, "The Northeastern United States is beginning to learn a lesson which the Southwest has already learned," I think there is a great lesson to be learned in what has been accomplished in all of the West as to reclamation and the proper use of water, and I will have to say that the West and particularly the Northwest probably has done a better job of water resource management than any other part of the United States, having the problem thrust upon them simply because of the very arid nature of the region.

I am hopeful that some day in the not too distant future, in fact in the near future, that we can apply this same type of thinking to the entire United States, and gain by the benefit of what was done in the Pacific Northwest.

Lastly, I would like to have you enlarge a little on your last paragraph.

At the time of the hearings on the original act, on the original legislation, one very significant thing was developed, and that was that there were not people being trained in universities in water resource management, and if you went out to look for faculty to expand programs or even to look for students to go into graduate area, they just didn't exist.

Now, you allude to the fact that your local institutions have "for a long time engaged in the training of professional water resource manpower."

I would like to have you tell me, if you can, just how many people have been graduated as undergraduates or how many are involved in graduate studies at Syracuse University or those universities that would actually be a nucleus or could go into the teaching area, into the graduate area or the research area. The testimony that was presented here last year showed that there was a great lack of people either involved in this activity, educational activity, there were no courses offered, there were limited research areas at the graduate level. I hope that what you say here is true, because I am afraid that a real close examination will show that it has been limited and that the students have been more interested in the area of physics,

nuclear research, and that there are not the people involved that you indicate that have taken a course in this type of study. Could you comment on that? Do you have some factual information as to what has happened at Syracuse in this area?

Mr. HANLEY. Well, with respect to Syracuse University, I am——

Mr. WHITE. Or any other university that you have knowledge.

Mr. HANLEY. Specifically Syracuse University, in view of its interest in community affairs and the central New York area, has for a long time engaged in a water research program that was designed to cure specific ills in that particular area. We have a number of lakes, and I point specifically to Onondaga Lake, and Lake Ontario. Syracuse University has for a long time engaged in research activities, hopeful that it might bring about a solution to the problems that exist within this somewhat localized area.

Mr. WHITE. Again, I would like to ask you how many people are engaged in this area? Do you have one professor and a couple of graduate students, or just what courses are offered in this particular discipline? Just what is being done at Syracuse?

Mr. HANLEY. I might say at this point that a little later in your hearing today, you will listen to the chancellor of this university. You will listen to a scientist who has been engaged for quite some time in this particular field at Syracuse University, and they are in a position, they will be in a position to point out quite emphatically and give you the numbers and whatever other specifics you desire with respect to the program at this university. I think that you will find that it has made a significant contribution in the area of water resource research.

Mr. WHITE. I want to thank you for your statements. I think you have made an excellent presentation. I look forward to directing my questions to the people from the university. Thank you.

Mr. HANLEY. Thank you, Mr. White.

Mr. ROGERS. Mr. Roncalio?

Mr. RONCALIO. Thank you, Chairman Rogers.

I have no questions for my colleague, but may I make a statement that I think will be useful. I am grateful for this opportunity to welcome you, my colleague, Mr. Hanley, to this committee. We labor in the Veterans' Affairs Committee together and we share concern for institutions of higher learning and of veterans' care in both of our districts.

I hope that Syracuse does benefit from the legislation, particularly to the end that it can help remove some of the common problems of the provinces of Canada and of the States which border the frontiers of Canada, and particularly of those lakes that are common to both nations with which you are familiar, Mr. Hanley. So I am especially hopeful that the legislation will pass, and that your university as well as ours can benefit from this most vital legislation.

Thank you very much.

Mr. HANLEY. Thank you.

Mr. ROGERS. Thank you, Mr. Hanley.

Mr. HANLEY. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. J. J. Pickle?

Mr. Pickle is a Member of Congress from the State of Texas.

We will hear you now.

STATEMENT OF HON. J. J. PICKLE, A REPRESENTATIVE IN CONGRESS FROM THE 10TH DISTRICT OF THE STATE OF TEXAS

Mr. PICKLE. Mr. Chairman, I appreciate the chance to appear before this committee. I have a written statement which I would like to have inserted in the hearings.

Mr. ROGERS. Without objection, your statement will be included in the record the same as if read in full, Mr. Pickle.

Let the Chair welcome you before the subcommittee.

(The statement referred to follows:)

Mr. Chairman, I am honored to appear before this distinguished committee today to speak in behalf of H.R. 6282, a bill to promote a more adequate national program of water research. This bill amends Public Law 88-379 to increase the funds available for research into any aspects of water problems, consistent with the mission of the Department of the Interior, which are not otherwise being studied. We are well into the period in which acute water crises and supply shortages are spreading across the Nation. We have made bold steps forward toward thwarting this crisis through the Water Resources Research Act of 1964. It is now imperative that we press on and implement this program by providing the funds necessary to enable us to enlist competence wherever it exists in water research. I can't emphasize too much the importance of giving some real strength and vitality to this section of the act.

This bill gives the appropriate emphasis to a second grant, matching, and contract fund through which financial assistance may be provided to any educational institutions, private foundations, private firms or individuals, or to local, State, and Federal agencies, to undertake research in water resources problems on which work is deemed desirable and which are not otherwise being studied. It provides for the widest possible participation by scientists in research on water resources matters, permits all institutions, public and private, and all disciplines to participate, and can be administered to supply stable support for programs in universities and yet obtain flexibility in research approach. It would also strengthen non-Federal participation in planning and carrying out water resources conservation and development programs, as well as providing a greatly needed opportunity for the training of scientific personnel for water matters.

Most worthwhile research needs adequate financial participation to extend over several years so as to afford adequate opportunity to pursue promising leads. Serious research often will not be undertaken by qualified scientists and engineers unless there is reasonable expectation of multiyear support. It is equally true that universities cannot be expected to become interested in this program without support adequate to pursue it actively.

The multipronged search for research competence provided by this bill is an important arm of our water research program. If we will give it the financial strength it needs, I am confident that we will approach with much greater speed the objective for which we are striving.

Last year, there was doubt expressed if the Department of the Interior—and the designated State agency, were prepared or ready to conduct a thorough and effective research program as set forth under title II. Accordingly, to be sure the institutions were ready, the amounts were reduced to \$1 million each for 10 years, and it was in this form that the bill, S. 2, was passed. During the past year most of the various institutions of the States have joined hands to develop a positive and realistic program for water development and research. In Texas, after many months of negotiations, the A. & M. University, the University of Texas, and Texas Tech have formed a water resources council to administer this program on a basis, as set forth in the purposes of this original act to "make the best possible use of its total water resources research and training competence through effective joint efforts of its major universities." Thus, our State is prepared to pursue the program with unity and boldness.

Mr. PICKLE. In addition, Mr. Chairman, I would like to comment on two phases of this measure, one with respect to the designated institution or institutions within a State that has been set out as being eligible for participation under the program.

I have discussed this with the chairman of the subcommittee and with the chairman of the full committee. When the measure was passed last year the language was somewhat limited in my judgment, because it was more specifically set up only for land-grant colleges, although the language was softened between the House and Senate versions. As passed, it did provide for either the land-grant school or the adjoining States or for a school within a State to join with other schools within that State. Within the State of Texas we had a problem in that our schools were not in agreement as to which was to be the sponsoring agency in the institute.

During the past 10 months we have spent considerable time talking to our institutions, and I am glad to say that the State of Texas has now reached agreement so that we have three fine schools that have entered into agreement to be the water resource council within our State. So we have resolved the problem that was a basic one I think for Texas and perhaps for other States which were before the Congress last year, so in the respect that the Congress pointed out that they ought to proceed slowly, we have approached the problem and solved it within the State of Texas, because three institutions now join hands and are in the process of making written agreements.

Now, as you will recall, the Congress, when the bill was passed last year, deleted title II, at least they put a limitation of only \$1 million for each of the 10 years for funds under title II, and accordingly the Department of the Interior—

The CHAIRMAN. Just a minute, that isn't a limitation. I want my colleague to understand that the President wouldn't implement this \$1 million that we had in the bill because of the provision for oversight authority of the Congress. This is the limitation, not the fact that we limited it to the \$1 million to start with.

Mr. PICKLE. I appreciate that point. My intent was to portray that we were limited in a sense with whatever we could do in title II; that is, \$1 million as reviewed by the Congress. As the chairman well knows, you felt, and I assume the committee felt and the Congress felt, that the various institutions and the Department of Interior should be able to show positively that they were ready to go forward under this program.

Now, I have listened with a great deal of interest to the testimony presented by Congressman Hanley, and the questions that this committee asked him. I don't know that I am any more prepared to answer the questions you propounded to him than he was. I do know and do recall that Dr. Renne with the Department of the Interior, when he announced the grants last year, to some 36 States, and I think pointed out that some 14 projects had been approved earlier, he pointed out that States were receiving some \$52,000 as I remember it for their grants. Now, when you spread the money that was available over 50 States, of course the amount of money that each State will have at this point is very limited, and, therefore, when you ask how many projects can they approve and how many people will be working, it will depend an awful lot on the amount of money that Congress makes available. I think you will agree that any institution, a university or a State, would be somewhat hesitant to enter into a lot of contracts or even attempt to unless they felt there was some continuity in the funds or permanency in the funds that are available.

I think the Department of the Interior now has over 400 to 450 of these kinds of research projects or grants that have been approved at this point. Whether they should be 500 or 1,000 is something that I know this committee is going to ask the Department of the Interior to present to you and show with proof positive that they can carry out these research projects, because I agree with the chairman that they must be able to show that they do have a solid, substantial program that they can support in the field of research.

I have asked the Department of the Interior before this meeting, and they said that they are prepared to defend the amount of research projects that they are going to recommend that would be provided under the bill that I have introduced. So I am assuming that during the day you will hear testimony from these people, and I sure agree that that ought to be established clearly.

The only thing that I know you would fully agree with is that whatever funds are made available, they ought not to be proliferated so much that you dissipate your funds, I started to say the butter spreads thin, the water spread so thin that you wouldn't have enough funds to carry out a worthwhile research project.

I have introduced this companion bill along with others to restore these funds in title II, and I hope very much that the committee will consider these favorably, will consider this request favorably.

Mr. ROGERS. Do you have any other questions?

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, I commend our colleague, Mr. Pickle, for his statement. I also wish to commend him for being diligent, after the act was passed, after Public Law 88-379 was passed, in seeking to get some consideration for the University of Texas. I am very much pleased to hear this morning that the three universities in Texas are working together.

I wonder, my colleague, if this would have happened if it hadn't been for the legislation that we passed last year. In other words, if we had permitted what some people wanted, wouldn't the three universities in Texas still be in part vying with each other for position?

Mr. PICKLE. The chairman may be perfectly right.

The CHAIRMAN. The House last year took the position deliberately that we wanted this program to get off the ground in an orderly manner. Now, when one thinks or when one knows that only 14 States were able to qualify for appropriations, that it has taken all the time since the enactment of the act up until now for the total 50 States plus Puerto Rico to come into position where they can qualify, it seems as if our modest beginning perhaps has borne some rather fruitful results.

Mr. PICKLE. Mr. Chairman, I was disappointed when the legislation was passed last year in its form, but I must say that your caution has been well established, because it has been a good thing, and I am glad it has developed. I think you are right.

The CHAIRMAN. Does my colleague know how many contracts are now being carried on for water research development with Federal appropriations?

Mr. PICKLE. The official of the Department of the Interior when he made his announcement last July, I believe said over 400 had been approved.

The CHAIRMAN. 1,545 by the Secretary's own statement.

Mr. PICKLE. Well, at that point the announcement said over 400, and I don't know how many now.

The CHAIRMAN. This doesn't mean just the Office of Water Resources; this means all.

Mr. PICKLE. Oh; yes, sir.

The CHAIRMAN. All Federal operations. Just one question: This is not especially for my edification, but I think it is perhaps for your protection. Should the Office of Water Resources Research be carried on primarily for the benefit and financing of college programs or should it be carried on to get the wanted and desired research solutions?

Mr. PICKLE. Very definitely the latter should be the approach in my view, and I think the universities will do this. Of course, they are going to be using doctors or experienced personnel on their faculty or where they might obtain them, and I think that is advisable. But it ought not to be a university program as such but rather to approach it on the basis as said in the original purposes of the act, I believe, to make full use of all the water resources of the Nation.

The CHAIRMAN. But this isn't an educational program to finance higher education in the United States.

Mr. PICKLE. I would not think so.

The CHAIRMAN. Thank you.

Mr. ROGERS. Mr. Baring?

Mr. BARING. Mr. Chairman, I would like to ask the witness, our colleague—are the three colleges in Texas that you mentioned land-grant colleges?

Mr. PICKLE. One of them is a land-grant college, the three institutions being the A. & M. University, which is a land-grant school, the University of Texas, which is the university for the State, and Texas Tech, which is in west Texas. We have a good spread, that is we have a west Texas high plains school, which is in excess of 18,000 people in enrollment; we have the University of Texas, the State institution of well over 26,000, and then the A. & M. University, which is an agricultural and mechanical school in the southeast area. So we have a spread from the high plain down to the coastal areas cutting across nearly all of our rivers.

Now, this doesn't mean, Mr. Baring, that no other institution would be eligible to participate, but the committee and the machinery that we have established, though it permits that addition, it can do it only when it has been shown that they are fully capable of carrying on the research. I would think that in the foreseeable future we would not expand that number.

Mr. BARING. I have in mind, Mr. Pickle, the fact that we are a land-grant college in Nevada, and I think the budget shows a considerable cut in land-grant colleges this year, a cut in moneys. So I am just thinking that maybe we ought to be very careful to see just what that has done, what budget cuts are going to do, and maybe get Interior to look into it, if we are going to have these water programs which are very necessary. I think we had better look to see what the budget is doing to our land-grant colleges.

Mr. PICKLE. I would agree with the gentleman that this would have to be a matter of caution. Our State, though, is big enough and we have so many water problems that we feel that other institutions

should join hands on this overall approach. For instance, the University of Texas has, and I think this is not a matter of argument, perhaps the largest water resources program underway today in the State of Texas, and though the bill as introduced was a land-grant bill, I don't think the Congress ever intended to cut off any funds from a school such as ours, and your language so indicates it. At the same time I don't think there ought to be funds taken from the land grants. I think this is something to be worked out within the State.

The State, working through their Governor and designated institutions, can set up what would be the proper machinery.

Mr. BARING. That is all, Mr. Chairman.

Mr. ROGERS. Mr. White?

Mr. WHITE. Thank you, Mr. Chairman.

I just want to compliment our colleague on his very excellent extemporaneous presentation, and his knowledge in the area, and I also want to compliment the people of Texas on getting together and putting three institutions in the field of water resource research, and I think this is a logical approach and I think they are doing a very good job.

Mr. PICKLE. Thank you.

Mr. ROGERS. Mr. Roncalio?

Mr. RONCALIO. No questions, but again a statement of appreciation to a State doing its own research rather than looking to other States.

Mr. ROGERS. Thank you, Mr. Pickle.

Without objection, the following Members of Congress, Mr. Thomas L. Ashley, Mr. Thomas G. Morris, and other interested Members will be permitted to insert their remarks in the record at this point.

(The documents referred to follow:)

STATEMENT OF HON. THOMAS G. MORRIS, A REPRESENTATIVE IN CONGRESS
FROM THE STATE OF NEW MEXICO

Mr. Chairman, it is my privilege to appear before you and your committee today to testify in support of S. 22, a bill proposing amendment of the Water Resources Research Act of 1964 (Public Law 88-379). That act established a water resources research grant program for creating water research centers or institutes in a land-grant college or other institution in each State.

Experience has demonstrated since the President signed the Water Research Act on July 17, 1964, that the amendments provided in S. 22 are a necessary step to facilitate carrying out the program's overall worthy objective of insuring the Nation at all times of an adequate supply of water, sufficient both in quantity and quality, to meet the needs of our rapidly expanding population.

These amendments would not change the purpose of the program, but would enlarge the scope, and would remove limitations from it which in the light of experience are acknowledged as being undesirable.

Title II of Public Law 88-379 provides monetary authorization for grants, contracts, and matching fund arrangements with educational institutions, private foundations, and other institutions. The amendments proposed in S. 22 would raise the funding authorizations from the rate of \$1 million a year, as provided in the original act, to \$5 million for the first year, thence increasing \$1 million annually for 5 successive years, and continuing at the level of \$10 million annually thereafter.

These amendments also wisely provide for eliminating the provision in the original act prohibiting support of title II research at institutions in which a title I water resources research institute is established. Obviously, since it is desirable for these institutes in the several States to become the Nation's centers for water research, arbitrarily restricting support for them would act to defeat the intent of this highly desirable national program.

As you know, Mr. Chairman, the whole future of the Southwestern part of the United States is fully and vitally dependent upon the availability of water in adequate quantity and quality.

I believe that no sounder investment in public funds can be made, and I solicit your considered support for these amendments to the Water Resources Research Act of 1964. Thank you.

STATEMENT OF HON. LAURENCE J. BURTON, A REPRESENTATIVE IN CONGRESS FROM
THE STATE OF UTAH

Mr. Chairman and members of the subcommittee, I welcome this opportunity to express my support for H.R. 3606 by our colleague, Mr. O'Brien of New York, and for similar bills introduced in both the House and the Senate.

The purpose of these bills is to expand and extend title II of the Water Resources Research Act of 1964.

Water is so vital a commodity in our nation today that it needs increased consideration. The Government has been giving it increased attention in recent years through the Federal agencies, as is appropriate. But I think it also important that the Federal Government diffuse and encourage research efforts in the 50 States. If this is done, much of the programs will be closer to the local and regional needs. Also, the efforts in the States will have the effect, as a side product, of training valuable manpower for continuing research.

The Federal research projects have made valuable contributions, but unfortunately, they have often tended to draw all the talent from other areas, thus in some ways diminishing what might have been done locally. And they have not trained new personnel to the extent that is possible by doing the work in the institutional and private research centers in the several States.

I think the important water research effort will draw much strength from diffusion, which this bill would encourage. The level of food production in this Nation is attributable in no small measure to the system of agricultural research in the State agricultural experiment stations. I would expect similarly desirable results from encouragement of State and regional research efforts in water problems.

Now, at this time, although sincere and important efforts are being made to fund needed research programs by the States, there is a definite need for funds that can be provided only the Federal Government, to help the States gear up to meet the problems. Funds provided under the Water Resources Research Act of 1964 have been extremely helpful in this respect. But the programs have just started. The changes proposed would constitute an orderly expansion. The best documentation of the need for this expansion is a look at the excellent projects already begun under the earlier act, which are beginning to meet a real need.

For example, under terms of the Water Resources Research Act of 1964, the Utah Water Research Laboratory, located at Utah State University in my district, has done significant work in development of water measurement devices and techniques, in devising an electric analog computer to simulate river basin studies, and in compilation of a hydrologic atlas of the State of Utah, which will summarize the water picture for Utah in terms of climate and hydrology. The laboratory has underway a broad program of water planning and development for the State.

Dr. Daryl Chase, president of Utah State University, and Dr. Vaughn E. Hansen, director of the Utah Water Research Laboratory, have contacted me within the past few days to urge passage of this measure. Dr. Hansen pointed out that there are a number of additional areas of study to which the laboratory would like to give increased attention if additional funds are made available under this bill. They have been unable to give to these the attention needed because funds have not been available from other sources. These areas include consideration of the vital matter of water quality, of best ways to blend the uses of available stores of surface water and ground water for the greatest benefit, of planning the sequential use of water for the maximum benefit of all users, of more accurately defining the ground water reservoirs, and learning the most efficient ways to recharge the stores. I think I am not merely betraying local pride, but am reflecting a view which would be accepted by leading authorities when I say the laboratory is particularly well equipped, because of its fine new facilities provided through appropriations by the State and supplemented by Federal funds, and because of its outstanding professional staff, to make an

important contribution to many facets of this vital study. We cannot afford, as our population and our needs grow, to make less than a maximum effort to assure ample, high-quality supplies of water. I urge passage of this bill, because it will be an important step in this direction.

STATEMENT OF HON. THOMAS L. ASHLEY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OHIO

Mr. Chairman and members of the committee, I appreciate the opportunity to speak to you this morning on behalf of my bill, H.R. 8916, to amend the Water Resources Research Act of 1964. This program, as we know, was established to meet the need for widespread research on a variety of urgent problems connected with the supply, conservation, and use of water, ever increasing quantities of which are required by our exploding population to meet new industrial, domestic, and recreational demands, as well as for the age-old production of food and fibers.

The Water Resources Research Act of 1964 established three grant programs. The first was to help finance the cost of water resources research centers at land-grant colleges in each State. The second program provided matching funds to assist States in carrying out specific water research projects approved by the Department of the Interior. The third program authorized grants or contracts by the Secretary of the Interior for research problems connected with the Department's responsibilities.

While an impressive start has already been made under the 1964 act, there is considerable evidence that the water research program should not be confined to institutes which are a part of the land-grant educational institution system, excellent as these organizations are. For this reason, Mr. Chairman, I last year joined three of my House colleagues in sponsoring amendments to the 1964 act which authorize the Secretary of the Interior to make grants, contracts, or other arrangements with educational institutions, private foundations, or with private firms and individuals whose training, experience, and qualifications are adequate for the conduct of water research projects, as well as with local, State, or Federal agencies. The legislation which I am introducing also increases the authorization for water research to \$5 million in fiscal 1966, increasing \$1 million annually for 5 years and continuing at \$10 million annually thereafter. The amounts provided in the act of 1964 were limited to \$1 million annually for 10 years and required that arrangements under this program be submitted to the Senate and House Interior Committees, which would have 60 days to disapprove them. Under the bill introduced today, this veto power would also be eliminated.

Under the limited appropriations made available for fiscal 1965, some 43 States submitted detailed applications for funds for water research projects in their land-grant institutions. Fourteen centers were selected out of the 43 applicants. A summary of the nine major categories of projects that have been submitted for consideration makes dramatically clear the need for the legislation which I have introduced and for continued support of a broad program of research of our water resources.

CATEGORIES OF WATER RESOURCES RESEARCH

First. Nature of water.

Second. Water cycle—including precipitation; snow, ice, and permafrost; evaporation and transpiration; streams and lakes, ground water and hydrogeology; oceanic influences; and forecasting.

Third. Water and land management—including water movement in soils; water and plants; watershed protection; water-yield improvement; erosion and sedimentation; upstream flood abatement; irrigation; and drainage.

Fourth. Development and control—including water supply; flood control—downstream; hydropower; navigation; urban and industrial water-use problems; recreation; fish and wildlife; estuarine oceanography; coastal engineering.

Fifth. Qualitative aspects—including characterization of wastes; effects of pollution on water uses; interactions of wastes; disposal of waste effluents; surface interactions; effects of development on quality; quality characteristics; and aqueous solutions.

Sixth. Reuse and separation—including saline-water conversion advanced waste treatment; improved treatment of wastes; treatment of water; and use of water of impaired quality.

Seventh. Economic and institutional aspects—including role of water in growth, economics of development and management; economic analysis of institutions; area appraisals.

Eighth. Engineering systems—including design; materials; and construction, operation, and maintenance.

Ninth. Manpower and research facilities—including education and training; and research facilities.

Mr. ROGERS. Are there any other Members of Congress who desire to testify?

If not, the Chair will recognize now Under Secretary of the Interior John A. Carver, who is substituting for Secretary Stewart L. Udall.

It has been suggested, Dr. Carver, that it might be well if you want Dr. Bates with you while you testify or any other members of your staff to advise the committee that you would like to have with you, we will be glad to hear them.

**STATEMENT OF HON. JOHN A. CARVER, JR., UNDER SECRETARY
OF THE INTERIOR; ACCOMPANIED BY DR. THOMAS F. BATES,
SCIENCE ADVISER TO THE SECRETARY**

Mr. CARVER. Thank you very much, Mr. Chairman. I decline the promotion.

Mr. ROGERS. Dr. Renne, I think you are scheduled to testify later.

Mr. CARVER. Thank you very much, Mr. Chairman. Again I will decline the promotion to academic ranks. I am just a plain ordinary politician without any graduate degrees on the subject before us.

Mr. Chairman, I ask leave to file, because it is already before the committee, having been submitted as an advance statement, the statement that Secretary Udall would have delivered had he been able to be here this morning.

Mr. ROGERS. Without objection, the statement will be included.

(The statement referred to follows:)

STATEMENT OF STEWART L. UDALL, SECRETARY, DEPARTMENT OF THE INTERIOR

Mr. Chairman, it is a privilege for me to appear before you in support of the legislation—S. 22 and House companion bills—being considered by your committee today. The legislation embodied in S. 22 would provide for the enrollment of the Nation's full research competence in the attack on our pressing water problems.

When the Congress enacted the Water Resources Research Act of 1964, Public Law 88-379, it implemented the recommendations of the Federal Council for Science and Technology contained in a report transmitted to the Congress by the President on February 18, 1963. Studies have demonstrated that the yearly rainfall that maintains streamflow and lake levels, on the average, is more than enough to meet all requirements for population and economic growth well into the next century. Those studies show, however, that there are complex and difficult problems of water resource development and conservation: to even out the annual and seasonal variations in runoff, to match the geographic area of water use with the location of water availability, and to provide for wise choices of alternate competing uses among industry, agriculture, and municipalities. Difficult problems face the Nation in providing increased water requirements for recreation and wildlife, in the development of new technology for maintaining the quality of water in our lakes and streams, and in preserving the beautiful waterways with which this Nation is endowed.

During the past year, we were forcefully reminded that water problems can occur in regions formerly believed to be essentially free from worry about water resources. The great Northeastern drought which affected the States from Maine to Maryland served as a timely warning that water shortages can occasionally crop up in regions once assessed as abundantly endowed with water by nature. Likewise, floods—the other extreme in the natural water situation—plagued parts of the normally arid lowlands of Arizona. We do not know what great anomaly in the global atmospheric circulation caused the Northeast drought, on one hand, and the Arizona floods, on the other, nor do we know if the circumstances controlling each event are related. These rare occurrences do indicate our need for research into global scale cause and effect relationships in meteorology so that eventually we will be enabled to forecast the end of drought such as that in the Northeast and to predict the probability of extreme floods over Arizona.

The Department of the Interior is responsible for the conservation of land and water and the administration of many programs requiring the maintenance of bodies of water for such utilitarian purposes as wildlife rearing and for the enjoyment of outdoor recreation. We are deeply interested in restoring the quality of our natural environment be it in the coalfields where we are developing remedial measures for the prevention and abatement of acid mine drainage waters, in Midwestern refuges for the conservation of wildlife, or in our many seashore areas where continued recreational benefits and commercial fisheries operations depend on proper management of estuarine environments. We have in the Department an almost staggering scope of water research needs associated with our broad responsibilities.

In a 1962 letter submitted by me to the Congress in regard to the water resource responsibilities and interests of the Department of the Interior, I said:

“The Department of the Interior is deeply interested in all aspects of water resources. But we are especially concerned with the use and control of ground water, with increasing our water supplies from all sources while at the same time conserving and developing multiple uses of existing supplies, with integrated systems of river basin and watershed development, with water in the environment of the fish and wildlife that inhabit this continent with us, and with the economic and engineering aspects of water projects of many different kinds. These problems of conserving and increasing our national water supplies, both in quantity and quality, are very pressing, and call for very large development expenditures. We cannot afford to skimp on the basic and applied research which may save literally billions of dollars in construction costs over the next decades.”

The foregoing statement of the Department of the Interior's water resource interest is even more applicable today.

In carrying out our responsibilities, we have developed comprehensive in-house research programs and foster some extramural research related to departmental missions. These programs—such as the research activities of Geological Survey, Office of Saline Water, Bureau of Mines, Fish and Wildlife Service, and Bureau of Reclamation—are excellent as far as they go, but because of limitations imposed by Bureau missions and inadequate financing, are far short of the ideal research program deemed necessary to cover all of the Department's needs in the water resource field. In previous congressional testimony, in June 1963, I pointed out that expenditures on water facilities in the United States were then \$10 billion per year and that less than 1 percent was being spent annually on water resources research. At that time I stated that “the Federal Government, the States, and local governments need vigorous research programs to maintain the efficiency of their operations in the water resources field. Doubling or tripling of water research is certainly necessary.” My remarks then are now applicable with even greater emphasis.

The research needs are definitely not limited to the Federal Government. Regional and local needs for research are just as pressing as those facing the Federal Government and because of the rapidly growing concentrations of population and industry in urban areas, they have become urgent. Very little work has been done in urban hydrology, yet this is one of the foremost problem areas needing study. There are many regions of the Nation faced with water problems that demand a multidisciplinary approach for optimum solution. One important provision of S. 22 and the companion House bills under consideration is that local or State government agencies can submit research proposals which if granted support would lead to the solution of some of the pressing local or

regional water problems. Some of our great cities could find support for their well-qualified water scientists to conduct research into pressing urban water problems that have gone unsolved for lack of supporting funds. Likewise, State water agencies could engage in water resources research under title II support.

A panel of eight distinguished experts appointed by the Office of Water Resources Research to review and report on the first year's operations of programs under Public Law 88-379 had this to say about the need for research that could be conducted if title II were implemented:

"Finally, it is the unanimous judgment of the panel that the water research effort and the training of water scientists are being gravely restricted by the failure of the Water Resources Research Act to enlist, on a par with the land-grant colleges and universities, the contributions and talents of other well-qualified institutions, individuals, and agencies.

"The enormous dimensions and complexity of the Nation's oncoming water supply problems, and the urgency of solving them in time, demand that we use the best trained scientists and facilities available, wherever they are. The plain and indisputable fact is that they are not always associated with the land-grant colleges and universities. Indeed, we block out large areas of unique competence from the Nation's water research service when we arbitrarily limit ourselves to the land-grant institutions.

"Accordingly, the panel wishes to emphasize the very pressing need to amend title II of the Water Resources Research Act at the earliest possible hour. The present situation with respect to title II effectively deprives the Nation of the water research resources available at such academic institutions as the Universities of Michigan, Texas, Chicago, Duke, Syracuse, and Princeton; and also such nonacademic organizations as Franklin Institute, North Star Research Institute, the Research Institute of the Illinois Institute of Technology, and numerous private firms and State agencies. The title should be revised to remedy this situation, to secure the additional research competence, and to provide adequate financial support for their participation in the program.

"The OWRR has received scores of unsolicited applications for authorization of research projects under title II. The authorizations and collateral financing could not be granted because of the prevailing restrictions, even though the proposed research could not, in all probability, be carried forward elsewhere with comparable skill and competence, if at all.

"Until title II of the act is amended, to remove the existing limitations, the OWRR and the Nation's water research program must be pushed along under a severe handicap, at half power."

There may be some concern over the administration of title II to insure that nonduplicative research is financed under it. The Department would apply the same tight administration to title II operations as has been so effective in the conduct of title I research. The record of the administration of title I, included in the first annual report of the Office of Water Resources Research, indicates how well the title II program would be administered. We foresee no difficulties in insuring that title II research operations are carried out in significant projects well related to filling gaps in or knowledge of good water development and management.

I appreciate the committee's interest in our Department's mission-oriented water resources research programs. I am always ready and willing to appear before this committee to explain the operations of the Water Resources Research Act and answer any questions the Committee may have regarding our administration of the act.

Mr. CARVER. I have a very brief statement of my own.

The legislative history of Public Law 89-379, the Water Resources Research Act of 1964, which would be amended by the bills before you today, indicates both congressional support for the program and congressional interest in how the program is carried out.

The bills pending before you today would do four things:

(a) They would increase the authorization from a \$10 million level spread over 10 years to a much higher amount beginning at \$5 million per year and rising to \$10 million a year after 5 years.

(b) They would remove the 10-year limitation on the authorization.

It would be without limitation as to years.

(c) They would make water research institute universities eligible under title II as well as under title I.

(d) They would eliminate the legislative oversight language to which President Johnson excepted when he signed the bill.

All these matters are discussed in our legislative report.

Dr. Renne, the Director of the Water Resources Research Act program, and other departmental witnesses are here to outline the program as it has operated since the passage of the original act, to explain why the increased authorization is necessary, and to detail the kinds of research work which would be available under title II but not authorized under title I.

As to executive-legislative relationships, the committee has before it the statement made by the President, and I don't believe that there is anything that I can add to that in terms of an executive branch statement. I would like to say to the committee that I am generally aware of the program which has been carried on under the able leadership of Dr. Renne, and that I am very much aware of the position which this committee took first in deleting title II, and then in agreeing to amend the form of title II, which eventually passed the Congress and which eventually was adopted, and which was the subject of the President's message.

I would like to state that the interest of this committee in deferring action on the title II aspect of it by striking it has in effect, although perhaps unintendedly, been carried out by the action of the President in deferring implementation, because we are now able to come before you with some of the kinds of information as to which the committee expressed interest in the first go-round on the legislation.

Mr. ROGERS. Mr. Secretary, it is your understanding and the position of the Department of the Interior that this program, and, of course, the one included in the 1964 law, are designed not only with regard to research in the availability of water but also the use to which it is to be put and can be put?

Mr. CARVER. Yes, sir. I am aware the Congress in enacting title I set forth some statutory guidelines as to the kinds of research which are to go on, and the enacted title II set forth two criteria that had to be related to the mission of the Department of the Interior, and not otherwise being performed.

Mr. ROGERS. Mr. Secretary, is it your understanding that this program in the first instance was justified on the present water shortages and impending greater shortages of water, not only with regard to perhaps new sources of water, but re-use of water to cope with the possible shortages.

Mr. CARVER. I don't think, Mr. Chairman, that the momentum for the original legislation was so limited just to the shortage situation. In a general way, of course, it reflected the greater public awareness over the whole spectrum of our Nation of the importance of water. The Congress had been considering bills like this for a number of years prior to the time it actually passed it, and I suppose you would say that it was shortage-oriented in the sense that people think about water mostly when it is short.

Mr. ROGERS. If you had plenty of water there wouldn't be any sense in spending \$10 million a year to research on its re-use, would there?

Mr. CARVER. That is correct. I think it is generally shortage-ori-

ented, but I don't think it was related to any specific or localized problem.

Mr. ROGERS. The only thing that I can see that you would need any research on insofar as water is concerned, if you had plenty of it, would be confined really to health purposes.

Mr. CARVER. I don't think that our people would agree that we shouldn't be generally interested in water just in terms of its quantity. We do have quality problems which I suppose would be another way of saying the same thing.

Mr. ROGERS. That is exactly right.

Mr. CARVER. And then we also have, you know, the environmental considerations, fish and wildlife habitat and things like that, which are also of great interest to us in our country.

Mr. ROGERS. Is it your position or the position of the administration that there is not a water shortage or an impending water shortage in this country?

Mr. CARVER. Oh, no, sir. I think that the Congress has already given evidence of this in a number of ways, facts which we also found out for ourselves. This country has to deal with problems of having enough water in the right places at the right time. I suppose, scientists at least tell me, that we are dealing with a fixed amount of water on this planet, but getting it where we need it when we need it and in the right amounts is going to be more and more a problem as our population grows, and so on.

Mr. ROGERS. Is this program intended to include the movement of water?

Mr. CARVER. I rather think that the——

Mr. ROGERS. Basin to basin?

Mr. CARVER. I rather think that the program would—well, frankly, Mr. Chairman, I have not really thought of it in those terms, but I don't know that anything is limiting in the statute that someone couldn't consider it.

Mr. ROGERS. I don't believe so, either.

The point I am getting to is this: Is there a controversy inside of the Department of the Interior, either interagency or interagency inside of the Department, with regard to the need for water because of an impending shortage of water in this country, a controversy that boils up to the extent that some people believe in the Department that all of this legislation is a lot of pork barrel, I believe, and a lot of money being spent, siphoned out throughout this country just to satisfy political requirements and spend money?

Mr. CARVER. I don't think that such a view is held within the Department. I know that under the leadership of the Secretary and Dr. Bates and others, we have had our attention called more and more forcefully to the importance of marshaling the knowledge in the scientific disciplines to the total problems of water in our country. I know of no one who thinks that this is merely a way to spread money out, as you say, on a pork barrel basis.

I think there is a strong feeling that the problem is of such a magnitude that getting people to work on it at the State level, where they can bring to bear upon it perhaps knowledge and approaches which wouldn't be present just on a one national program has definite advantages, particularly when they participate in the funding of it there.

Mr. ROGERS. Of course, though, you are beginning from the premise that there is a national water problem, a definite national water problem.

Mr. CARVER. Yes, sir; I think that there is.

Mr. ROGERS. And without a definite national water problem, then these programs and a lot of other programs we pass up here wouldn't be justified, would they? If we had no problem you wouldn't need an answer.

Mr. CARVER. We have had water problems, as I think Mr. White indicated a while ago, we have had water problems for 100 or 200 years; that is the problem of getting water to land. That is a water problem.

Mr. ROGERS. Now, do you know of any of the higher officials in any of the agencies of the Department down there who feel that most of these water programs are unnecessary, that there is no water shortage, that a lot of this has been misrepresentation, and that the taxpayers are being bilked by these programs being passed?

Mr. CARVER. No, sir.

Mr. ROGERS. And that a stop should be put on them?

Mr. CARVER. I know of no statement along that line. I know that speaking just generally in theory, the scientists tell you how much water runs through the hydrologic cycle, and they would say that that much water, if it were uniformly spread, would be enough for everybody, but it isn't uniformly spread.

Mr. ROGERS. Of course that is exactly right. I think this is true with everything material. We have got plenty of canyons for the United States, but it just happened to put the Grand Canyon out in the western part and I have heard of no program to share it with New York or West Virginia. But the point is this: that the existence of water in Canada or Europe is not going to help the people in lower west Texas, is it, unless you can get the water there?

Mr. CARVER. I think the chairman is absolutely right, although Canada—

Mr. ROGERS. Let's confine it to the United States now, Mr. Secretary. With regard to the United States, talking about a national problem rather than a world problem, you know of no one in the Department who feels, as I said before, that it is not a national problem, that we have plenty of water, and that most of these programs are simply pork barrel operations and activities?

Mr. CARVER. No, sir; I know of no one who thinks that.

Mr. ROGERS. Would it surprise you if there was someone in there preaching that doctrine?

Mr. CARVER. Well, I have heard every range and spectrum of view in our Department, so nothing would surprise me any more, but there is no official statement.

Mr. ROGERS. I am referring to some of the policymakers making speeches throughout this country, and I was very much surprised and I expect to go into the matter further, because everything I have to date is hearsay. I would hope that if there is such a position in the Department, and if the people are going to take that position, then they ought not to be taking it as the official position of the administration or the Department unless it is true.

Now, if it can be proven to be true, I think that the administration would change its position.

Mr. CARVER. I think the President has accurately stated it in terms of his message on this bill, that it is one of the most important problems facing our country.

The CHAIRMAN. If the chairman will yield?

Mr. ROGERS. I will be happy to.

The CHAIRMAN. If there is a grade 12, 13, or 14 in the Department of Interior that is making such observations as has been suggested, and it wouldn't be the first time it happened, and people hear them, then how in the name of commonsense can those people respect the Presidential expression of policy when this employee is undercutting any kind of policy because he is on the ground. This is the thing that bothers the Members of Congress. It not only happens in this particular—may happen in this particular instance, but it does happen in other instances, as the Secretary knows.

Mr. CARVER. The chairman of the full committee has put his finger on a very important problem of discipline which in any large organization is a constant challenge to the leadership, and one we should continue to work on.

Mr. ROGERS. Mr. Secretary, with regard to the water problem, if we did not have a substantial water problem in this country, there would be little sense in spending millions of dollars in efforts to desalinate water.

Mr. CARVER. That is correct.

Mr. ROGERS. Unless we just want to make a contribution to some foreign countries that don't have anything but salt water.

Mr. CARVER. The whole impetus, the whole force of the national effort is directed toward catching up and getting ahead of the water supply and the water quality problems of this country. To say that there isn't a problem is just flying in the face of plenty of evidence.

Mr. ROGERS. Do you feel, generally speaking, the officials who have been entrusted with these responsibilities in the Department of the Interior are agreed that all of these programs are justified from a basic standpoint, from a basic need standpoint and not from a political program to hire people and spend money?

Mr. CARVER. Oh, yes, sir; I will say that categorically.

Mr. ROGERS. It would be very dangerous if you didn't, Mr. Secretary. I assume it would put you on the spot. Certainly they should, but my point is this: I think if people are going to subscribe to a program and participate in it, they at least ought to be loyal or else they ought to prove their allegations and charges, if they are making them.

I have heard some evidence that they have been made.

Now, one other question, Mr. Secretary, and this may be an unfair question, too. Why do you think that the President and the Department does not want the Congress to look over their shoulders on these matters, as was expressed in the Presidential message, with regard to the language in title II of the bill as passed.

Mr. CARVER. Well, I can speculate, of course. The history of our Republic would indicate that there is a continuing, not conflict, but a continuing dialog I guess between a President and the legislative branch as to the nature and extent of legislative oversight of executive functions. The President stated two reasons, one of which was constitutional or quasi-constitutional, and the second one was administrative or quasi-administrative. On the first one he expressed the

feeling that the language transcended the bounds of proper legislative oversight under the Constitution, in spirit if not technically. As to the second, he said that the program could not be effectually carried out with the time limits and the other necessary provisions of the language in title II.

So those were the two reasons as to why the doubt is expressed.

Mr. ROGERS. This bill goes on ad infinitum, doesn't it?

Mr. CARVER. Of course a new aspect has been added in the bill now before you, which was not presented in the President's message, when he signed the bill. The open-ended authorization is a new provision, and insofar as I know, the President hasn't expressed any position on that, other than through the Bureau of the Budget, to agree to the legislation in this form.

Mr. ROGERS. Mr. Secretary, the thing that disturbs me about that, I think if we are going to get into technical constitutional questions, that the Congress of the United States which is elected every 2 years by the people, which I think will continue in the House of Representatives, is the one that is answerable directly to the people in a self-governing philosophy of government. I would think that if they do not want continued oversight by the legislative committees of the Congress, then the legislative committees of the Congress ought not to permit authorization for any amount of money except for 1 or 2 years at a time, not more than for the continuance of the Congress that did it, because one Congress does not bind another. And when you grant a blanket authorization from now on, you are giving powers that perhaps will not be abused but which very well could be.

Mr. CARVER. Of course the Congress can come back in and cut it off at any time.

Mr. ROGERS. Yes, sir, but my experience has been this: It is a whole lot harder to repeal a bill than it is to pass one.

Mr. Aspinall?

The CHAIRMAN. (Mr. Aspinall). Mr. Chairman, I would ask unanimous consent that Dr. Bates be permitted to give his statement, and that we question the Secretary and Dr. Bates at the same time, and also that Dr. Bates be permitted to come to the table when we have Dr. Renne.

Mr. ROGERS. Without objection, Dr. Bates, you may proceed to give your statement.

Dr. BATES. Thank you, Mr. Chairman. I have a brief statement. With your permission, I would like to read it.

Mr. ROGERS. Without objection, you may proceed.

Dr. BATES. Mr. Chairman, my name is Thomas F. Bates. I am Science Adviser to the Secretary of the Interior. I came to that position last June from the Pennsylvania State University where I was assistant to the vice president for research and an assistant dean of the graduate school. My testimony today is addressed principally to the need for strengthening the water resources research program through the authorizations that would be provided by enactment of S. 22 or H.R. 3606 and companion bills. Even though my statement will be fairly brief, I appreciate the opportunity to appear before you to present my views on the new opportunities for advancement through the research which would be authorized through enactment of this legislation.

With its many years of familiarity with water resources matters, this committee needs no comment from me about the importance of water resources and the urgent need for new and improved means for dealing with the problems of bringing water supplies and water requirements into balance. The committee's favorable action in 1964 on the basic authorization of the Water Resources Research Act constitutes your clear recognition that research holds promise to solve difficult water problems at local, State, regional, and national levels.

It may, however, be worthwhile to refresh our recollection of just how severe water problems have become even in the Northeastern States, where water is usually regarded as being plentiful. As a native of Pennsylvania, I can speak to this point with acute personal awareness. Diminished flows of the Delaware River permitted the upstream migration of saline and brackish water from the bay. From day to day, almost from hour to hour, there was imminent hazard of salt water reaching the intake of the water supply system for a major part of the Philadelphia metropolitan area. You will recall that it took the combined efforts of the States of Pennsylvania, New Jersey, and New York to contain that hazard; and to supplement the efforts of the States, President Johnson mobilized Federal agencies including the Corps of Engineers, the Geological Survey, the Public Health Service, and others.

Although the incidents of last summer's drought of the Northeastern States may have been exceptionally dramatic, they are by no means unique. Throughout the United States, as has been well documented in reports of the National Academy of Sciences-National Research Council and of the Select Committee on National Water Resources, municipal, agricultural, industrial, and other segments of the public are facing increasing stringencies of water quantity and quality.

Congress has recognized the importance of research as a means of dealing with water problems. The first year's operation of the Water Resources Research Act program confirms its soundness. On this point, I am able to speak both as the science adviser to the Secretary of the Interior and also as a university scientist who has been involved in the program of water resources research at Pennsylvania State University that is supported under the act. In both capacities, it is clear to me that the involvement of non-Federal research competence significantly enhances opportunities to work out solutions to water problems. The land-grant university-based water research centers have brought to bear on water problems a large number of well-trained, experienced scientists and engineers. In fact, it has also made us aware of relevant competence that had previously escaped attention; professors of law, geology, soil science, and many others who until recently were not known to be interested in water resources are now doing productive research in this field. Dr. Renne, Director of the Office of Water Resources Research, who will testify after me, will discuss program aspects in more specific detail. I should like to record, however, that the program unquestionably is a valuable addition to the national effort in water resources research which complements other ongoing efforts.

In spite of the effective progress that is being made under the title I authorization, it falls seriously short of meeting research needs and

utilizing existing research capability. A very large number of universities of all types—not just those of land-grant status—have important resources in the form of engineering and scientific talent and facilities that are needed in the program we are discussing today. These talents and facilities are not being effectively utilized through the water resources research centers. This lack of participation is not due to lack of willingness or of cooperativeness because in my observation there is a willingness to cooperate amongst both the land-grant and non-land-grant universities. President Morgan and his associates will, I believe, testify later on the problems and difficulties that limit participation by noncenter university scientists. I would urge the committee's most earnest consideration of the fact that water resources problems are so complex and urgent that we as a nation cannot afford to bypass the large amount of university research competence that, under present limitations, is not being effectively applied to water resources research.

A second very important unused reservoir of research competence exists in the nonacademic organizations. Research institutions have demonstrated that capability both in Government and in industry. Throughout the entire range of the national economy, our growth has its roots in research, whether it be research on methods of water quality control, on food processing, or research on antimissile missiles. Much of this research is performed by scientists and engineers in research institutions and private firms; and significant work also is done by small independent groups and individuals. This represents a great national asset that, by and large, is quite different from the research competence of the universities. I shall not elaborate that in my testimony because I see that the witness list includes a number of representatives of these organizations who can inform the committee about contributions they can make to solving water resources problems. I would repeat, however, that in view of the gravity of water problems, this is a research resource that should not be neglected.

I can foresee additional benefits which can result from an expansion in the number and types of institutions participating more extensively than at present in the water resources research program of the Nation. For example, one is the increased cooperation on and associations with common problems at the local level which will take place directly amongst the groups involved. The Federal support will serve as a catalyst which I believe will promote a web of communication and cooperation amongst the institutes, non-land-grant universities, industries, communities, and other groups that are concerned with the water resources problems of a State or region. Such relationships promote an understanding between research scientists, engineers, and resource managers that is fundamental to much progress which has already been made in natural resources development and in agriculture.

The program made possible by the Water Resources Act has some strong features which I would like to point out. It has and will continue to administer a Federal and locally supported mission-oriented program of water resources research. This program can conduct or encourage total system reviews, fill gaps where research is inadequate, and place new emphasis where it is needed. The overall effort must be carefully planned and its execution skillfully done if the urgent problems before us are to be solved. This legislation offers the poten-

tial of bringing more scientists, engineers, and other types of competence to bear on this mission-oriented effort. The flexibility we will have to accomplish research and other studies will be greatly increased if it is enacted.

In summary, then, I suggest to the committee that reassuring progress has been made through the title I authorization and that, as a land-grant university scientist, I find abundant justification for strengthening the program through the title II authorization.

Mr. ROGERS. Thank you, Dr. Bates. Let me ask you one question and then I will yield to the chairman and to other members of the staff.

Dr. Bates, what do you think is the No. 1 water problem in this Nation?

Dr. BATES. Proper distribution in time and location to meet water quantity and quality needs.

Mr. ROGERS. How long will that be the No. 1 problem?

Dr. BATES. This is hard to predict because it relates to how our population grows, how our industries disperse within the Nation, and so on. I believe it will remain with us for some time.

Mr. ROGERS. Mr. Aspinall.

Mr. ASPINALL. Mr. Chairman, I did not make a statement at the beginning of the session. The first few remarks that I have to make this time will be a statement, and there will be some questions which I hope that Director Renne will have in mind when he comes to the stand.

Mr. Secretary, as you have said, this legislation would reinstate the language of title II which was rejected by the House in 1964. In addition to the fact that the House felt a \$20 million a year program was a little ambitious at the start, this new approach to water resources research title II program was not adequately justified in the 1964 hearings. Most of the testimony was related to title I program which was established and which did establish the Water Resources Research Institute in each State and provided additional funds for specific research work at these institutes.

Also the committee felt that the language of title II was so broad that it provided no indication of the type of research envisioned for guidelines in administering this program. The token program authorized under title II which came out of the action of the conference committee was approved along with the review provision in order that we might determine by our review of specific research proposals what kind of a program the Department of the Interior would initiate. Unfortunately no program has been initiated under title II.

Now we have the same language before us again, practically the same language, with the same questions that we had in 1964. What we want to know, Mr. Secretary, is just what are the research needs you have in mind meeting under this language and what types of arrangements will you approve?

For instance, what will be the requirements for matching of Federal funds? How do you anticipate private firms and individuals will participate? How will the funds be apportioned among the various categories of participants. Under the language suggested you could give all the funds made available under this act to agencies within your own Department. Do you intend to support water research at additional universities or other educational institutions within the various States? In this connection, you will recall that this committee

took a firm position that there should only be one research institute or center in each State with all Federal support channeled through this one institute even though the research work could be performed by several universities or other institutions. These are the kind of questions that this committee or at least the chairman of the full committee has and will expect to have answered on this legislation.

Mr. Secretary, as a matter of record and for the information of members of the committee, would you tell the committee why funds to implement title II of Public Law 88-379 in 1964 have not been requested by the Department of the Interior?

Mr. CARVER. Yes, sir. As a matter of record we are precluded for asking for funds by direction of the President as detailed in the message when he signed the bill.

The CHAIRMAN. Can you assure us that if all the authority that you seek is given to you, can we of Congress expect the executive to make the funds available?

Mr. CARVER. If I understand it—

The CHAIRMAN. It is a tough question and if you don't want to answer it, all right. I think it serves its purpose by the mere fact that I asked it. What bothers some of us is that we authorize these programs, that the Executive and the administrative departments ask for, and then the Executive refuses, for some reason or other, to ask for the funds which he himself has approved in his signature to the legislation, and sometimes even when he has approved the legislation and has recommended the funds, and the Congress has appropriated the funds, and the President has approved by his signature the appropriation bill, then the President sees fit, for some reason or other, to use his authority and cut down expenditures and state to the people of the Nation that this is done in the name of efficiency and economy, making it appear as if the Congress of the United States was the body which was the spendthrift. What I want to know, if you wish to answer, is, Can we expect to have this program implemented as it is being presented to us, or are we likely to have it cut to pieces by the executive department?

Mr. CARVER. If I may use the chairman's term if likelihood and not absolute assurances, I can say that this program has strong support, and I believe that if the legislation were enacted as recommended by the administration, the program would go forward. But I have no way of making any assurances which would bind the administration, because I don't have that authority.

The CHAIRMAN. I can appreciate why you would want to be cautious. Now, Mr. Secretary, the chairman of the committee referred to the request of the Executive to have the 10-year limitation removed. What is the purpose of this recommendation to the Congress?

Mr. CARVER. The purpose of course is to state to the Congress that we think that we have a program which will involve needs which will be continuing in terms of the growth of our population and increasing demands for water, and so on. The specific suggestions of open ended necessity as compared to 10 years, which is quite a long authorization in ordinary practice, I can't answer further.

The CHAIRMAN. Mr. Secretary, we have several programs which do have limitations placed upon their life, and Congress as a rule has been rather cooperative, has it not, in extending those programs within

a time not to embarrass the continuance of the program, if it seems to be a good program.

Mr. CARVER. I would say we have many more programs which require renewal than we have that are open ended; yes, sir.

The CHAIRMAN. You see what bothers me, Mr. Secretary, is that up until the early twenties, the authorizing committee and the appropriating committee were one and the same committee, and then Congress saw fit, with the President's recommendation in the early twenties, to provide for an appropriation committee, so that the only oversight that you have in a program that doesn't have at least the request for review, as the public law in this instance has, is a limitation on the life of the program, because one cannot expect the Appropriations Committee, with all of the ramifications that it has, to maintain a close review of some of these programs.

Now as far as I am concerned, I just want to go on record right here and now that the 10-year limitation is absolutely necessary in this legislation, because otherwise we would be in the same position that we are in in come of the Bureau of Mines operations. Authority that was granted 40 years ago is still the excuse on which to ask for appropriations and start new programs without coming to Congress for new authority. Although I can understand the Executive's position on this question of review, I won't quarrel with that, it seems to me that in order to have the proper oversight operation by any committee, especially a committee like this, we must have a limitation on the life of the program. Do you have anything to say to that?

Mr. CARVER. I know of nothing in any of the briefings I have had or any of the knowledge I have gained in working with this program and others in the Department, which would cause me to say that the administration would adhere absolutely firmly to a completely open ended program: I cannot say because I have not cleared it as we must clear these things, how we would react to a 10-year program, but I don't think we objected to it before, so I wouldn't see why we would now.

The CHAIRMAN. The Department does come up here today with this recommendation.

Mr. CARVER. Yes, sir; but the question as I understand it is how would we feel if the limitation was put back in, and I am sure we would rather have the program with the limitation than no program at all, the 10-year limitation.

The CHAIRMAN. The reason that I was asking that of course and haven't gotten an answer, is that we have sent other bills down, just like we sent this original legislation down, and they were approved but the message itself made implementation impossible almost. There is no need of us wasting our time if this is to be the continued position of the executive department. This has been true as the Secretary knows in regard to the legislation relative to concessionaires' contracts in the national parks.

Mr. CARVER. Yes, sir; I am aware of that.

The CHAIRMAN. Mr. Secretary, going back to the statement that I made in the beginning, isn't there some way to enlarge upon the language which you have proposed from your Department, so that it better indicates the kind of a program that is intended to be authorized, and language that will provide guidelines in the administration of the program?

If you would rather have Dr. Renne answer that, that is all right with me.

Mr. CARVER. I would appreciate that opportunity, Mr. Chairman.

The CHAIRMAN. Dr. Bates, your statement has emphasized the talent and the research competence available in universities and institutions other than the land-grant colleges, and also the research competence that exists in nonacademic organizations and research institutions. You haven't given us any information on the specific research needs. We keep hearing about gaps in our overall water resources research program. What are those gaps?

What are the specific research needs that justify Federal financial support of private research institutions and organizations?

Dr. BATES. I believe that there are a great many gaps related to such things, as the chairman of this committee, Mr. Rogers, has already indicated in his conversation with Mr. Carver. For example, this problem of securing appropriate water distribution from one place to another in between basins, and so on.

The CHAIRMAN. Doctor, let's keep this thing on the right road here. You are not coming in here suggesting that we are going to have contracts authorized under the Office of Water Resources Research that would study the problem of bringing the water from the Columbia River Basin down to the Southwestern United States?

Dr. BATES. No, sir; I am not.

The CHAIRMAN. What are you talking about when you talk about distribution?

Dr. BATES. I believe that there are our basic research needs that relate to the quality of water, for example, that is present in different parts of the United States that need to be solved in basic chemical research, for example. If in a particular region where water is short it can be researched to the point where we can use available supplies and recycle them in that particular region, that means that we do not have to worry about some of these larger distribution problems of getting water from one region to another. This is the type of thing I was suggesting from the standpoint of the role of basic research in this area.

The CHAIRMAN. You will be with Dr. Renne this afternoon and tomorrow morning; will you not?

Dr. BATES. I can if you wish.

The CHAIRMAN. When he is before the committee, because there are several of these research contracts that bother me a little bit and I would like to have you present if you can be.

As you have studied this program, Dr. Bates, what do you envision as the ultimate amount that might effectively and efficiently be expended in carrying out the purposes of this program?

Dr. BATES. I believe that the director of the program is the proper person to direct that question to. I can say that as a research scientist now placed in a position in the Department, that this is an open-ended question, because as we progress in our research we will also be progressing from the standpoint of what our needs are. There are very few research programs that I have been involved in where research of itself does not develop new areas which deserve more attention. Also, as the size of the country increases, we must devise new research aspects to meet the increasing needs.

I don't believe that you can face up to that question.

The CHAIRMAN. Of course, that question was prompted by your third sentence. "My testimony today is addressed principally to the need for strengthening the water resources research program through the authorizations that would be provided by enactment of S. 22 or the House bill."

I thought maybe rather than leave it open ended like you have left it, we might have some idea as to what you think the program would lead to.

Dr. BATES. Let me say right now with regard to the proposal, that I see an immediate need for moving as we have recommended, which is essentially approximately doubling the amount of the program. Now from the standpoint of what our needs will be next year or 3 years from now, that is the question I am addressing myself to, with regard to the ultimate number of contracts and the total amount of research which I don't believe we can answer.

The CHAIRMAN. In 1 year you believe that we should double the program. Do you mean it is more than likely by the end of next year we should quadruple the original program?

Dr. BATES. I think I will be prepared to answer that question at the end of next year. I certainly wouldn't want to try to answer it now.

The CHAIRMAN. You see we are laymen, Doctor. We are just laymen trying to figure out where the taxpayers' benefits come into the picture, and we understand about scientists because one scientific problem studied more than likely will lead to a dozen others. I thought it might be well to have something in the record as to what we could expect from this program not in the 10th year but perhaps in the 3d or 4th year.

Dr. BATES. I believe it is quite evident from the standpoint of the amount of talent and facilities that we are not using at the present time that we could be using in this program that it is justifiable to go ahead at the rate that is proposed here.

The CHAIRMAN. How long have you been with the Department, Doctor?

Dr. BATES. Since June 1.

The CHAIRMAN. Since June of last year?

Dr. BATES. That is right.

The CHAIRMAN. Just about the life of the program.

Dr. BATES. Approximately.

The CHAIRMAN. Has anything that we did during our study of this legislation or the manner in which we finally authorized it led to any lessening of the effectiveness of the program?

In other words, could this program have been further advanced efficiently and orderly if we had given a broader authorization than the act provides at the present time?

Dr. BATES. From the standpoint of my knowledge of the program, I honestly don't believe so. I think it is too early to say what the effects might be, but as I look at it at this present time, the program has, from the university point of view, at least my university point of view, provided very fine opportunities to move ahead in an area that we have felt badly needed strengthening. I am sure there have been inconveniences which we have all been concerned with, with regard to

setting up the program. This goes for any new program. But from where I sat in the university, this looked like a very good program, and we went along with it. I think we will continue to do so. We welcome it.

The CHAIRMAN. On page 3 you have this statement:

In fact, it has also made us aware of relevant competence that had previously escaped attention; professors of law, geology, soil science, and many others who until recently were not known to be interested in water resources are now doing productive research in this field.

Do you have some instances that you can give this committee as we write legislative history of the proposed act?

Dr. BATES. Yes, sir; I can give you this, supply you with instances from my own university if you wish, and I believe Dr. Renne can give you many other instances that I am not familiar with.

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, I would ask unanimous consent that when this information is received that it be placed in the record at this point.

Mr. ROGERS. Without objection, it is so ordered.

(The document referred to follows:)

Some examples of scientists and engineers who are now carrying on research on water resources problems with support through the Water Resources Research Act program and whose interest in water resources was not known until recently include:

1. Dr. L. E. Erickson, chemical engineer, Kansas State University.
2. Dr. C. Weinaug, petroleum engineer, University of Kansas.
3. Dr. Paul W. Barkley, economist, Colorado State University.
4. Dr. Oscar R. Bart, economist, University of Missouri.
5. Dr. R. H. Dinius, chemistry, Auburn University.
6. Dr. R. C. Smith, economist, University of Delaware.
7. Mr. N. E. Collins, agricultural engineering, University of Delaware.
8. Mr. Guy J. Kelnhofer, Jr., resources planning, Georgia Institute of Technology.
9. Dr. C. S. Martin, civil engineering, Georgia Institute of Technology.
10. Dr. R. S. Whaley, economist, Utah State University.
11. Dr. W. W. Crouch, political scientist, University of California, Los Angeles.
12. Dr. Dwaine Marvick, political scientist, University of California, Los Angeles.

The CHAIRMAN. You have at the bottom of page 3 these sentences.

These talents and facilities are not being effectively utilized through the water resources research centers. This lack of participation is not due to lack of willingness or of cooperativeness, because, in my observation, there is a willingness to cooperate amongst both the land-grant and the non-land-grant universities.

Can you give us instances referred to where there has been lack of participation because of the fact that the act is a little bit more strait-laced than the Department wants it?

Dr. BATES. I am speaking of lack of participation because we have not had the title II provision.

The CHAIRMAN. I understand that.

Dr. BATES. Yes; I am sure we can supply you with specific cases if you wish.

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, I would ask that this be made a part of the record.

Mr. ROGERS. Without objection, it is so ordered.

(The document referred to follows:)

It is my belief that the provisions of title II which authorize appropriations to the Department of the Interior to be used for grants, contracts, matching or other arrangements for conducting research into aspects of water problems related to the mission of the Department of the Interior are desirable. They will allow for the participation by scientists in research on water resources matters, permit all institutions, public and private, and all disciplines to make contributions in the search for means to allow the Nation to secure maximum benefit from its most valuable resource—water.

Under title II, activities dealing with some of the nonphysical aspects of water resources such as management, organization, and institutional administration of water resources could be carried out effectively through participation by private and public organizations that are eminently qualified to carry on research of this kind by virtue of experience accumulated through association with those who administer water supplies, construct and improve water facilities, and operate and test equipment employed in water programs.

Under title II, competencies developed in industry such as the use of systems engineering and systems analysis techniques in the aerospace industries could be utilized in the application of those techniques to water resources planning.

Also under title II, research and development of advanced instrumentation for water data collection, for water quality monitoring, and for telemetry of water data could be accomplished effectively by industrial concerns already possessing the know-how and skilled staffs required for this kind of activity.

Other kinds of needed research that could be undertaken through title II are the reduction to practice of laboratory findings related to feasibility studies. Such studies as testing the feasibility of a new practice for the conservation of industrial water could probably best be carried out in the environment in which it is to be used by the industry involved.

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, that is all that I have. I will reserve the balance of my questions.

Mr. ROGERS. Mr. Haley.

Mr. HALEY. Mr. Chairman, I don't think that I have any questions. I would just like to say, Mr. Secretary, that insofar as water research I think that you know the attitude of this committee. It is something that we are vitally interested in. But you continue to come here and present legislation with an open-ended bill of this kind; in other words, there is no end to it at all. Probably 10 years is as long as you people in the department will be down there and as long as I will be in the Congress, and I think we should have a ceiling on this project so that at least future Congresses will have an opportunity to take a look to see where you spend the taxpayer's money and what you are accomplishing. So I would be absolutely opposed to ever giving you any such open-end authority in this or any other legislation.

As a matter of fact, I think it would be wise to have every Congress review these programs to see how well you are doing and what you are really accomplishing. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Baring.

Mr. BARING. No questions.

Mr. ROGERS. Mr. White.

Mr. WHITE of Idaho. Thank you, Mr. Chairman.

Dr. Bates, I have some of the same reservations with respect to your testimony as does the chairman of the full committee, and I don't believe it has been clearly shown to me what end point you have in mind. You talk about a total effort in areas that are not being used at the present time, and I realize that we have a big undertaking here, and I realize that there are a lot of facilities that can be used. But like anyone doing any job, there is only so much that can be

used. It can't be all of the available people and the centers that are now in existence or could possibly come into existence. I have the questions here in front of me: How many do you think are needed? What is the need? How many of these various institutions should be added? Is the limitation to be funds? Is the limitation to be the programs that are of necessity needed in this area, or is it kind of a searching thing to use as many people as you can envision? I think a clarification in this area would be most helpful to the committee.

Dr. BATES. I think my view on this, Mr. Congressman, is that we are engaged here with a large complex natural system when we talk about water and water resources. When you try to bring to bear the talents and abilities of the United States to apply to this system, you must not limit your capability by picking one specific group over another relative to all the expertise.

I will get to the specifics in a moment, but I want to make the first point that all of our good research scientists and engineers are not just at the land-grant universities. We need to bring in the people in the industrial labs and the other university laboratories as a total system to apply to our total research effort.

Now in terms of how fast we can go in this area and how many people we need on board, this is where I have a problem, because I myself cannot anticipate at this point how fast our results are going to come through. I believe that we have justification at this present time to move from the land-grant universities, bring the other universities on board, bring the industries on board with all their talents so that we are hitting the problems from all the possible directions. I see, therefore, a need to move at least as fast as this particular act would permit.

Mr. WHITE of Idaho. Then in essence what you are saying, that the funds available under this proposal you feel would be sufficient to approach these other areas, to bring them into the program, and to screen the available institutions and corporate entities for their talent and expertise and proceed from that point.

Dr. BATES. As we see it at the present time. Now I believe that we may find within 1 or 2 years relative to the problems developing over our Nation the increased need for water of the right quality at the right place and time, and we may want to move much more rapidly than we have been moving thus far relative to the continued solution of the problems that confront us.

The CHAIRMAN. Will my colleague yield?

Mr. WHITE of Idaho. I will be glad to yield.

The CHAIRMAN. My colleague will remember one of the arguments for this legislation in 1964 was that we needed to train more scientists in water matters. Apparently we have got so many of them now that we can't take care of all of them and get their services.

Mr. WHITE of Idaho. The chairman will remember I alluded to this in my original questioning, and I still haven't had that question answered, and I hope that perhaps Dr. Bates could give his experience and feeling in the area as to people who are really qualified, capable, and who have a background to proceed in this area, and the research centers that are available that he is talking about. I happened to sit in an airplane with a man the other day that was headed into Canada to do water research for the city of Vancouver, Canada, a man whom I

thought had a high expertise in this water research, and it interested me to discuss water problems with him. We were told at the time of the previous hearings, particularly when universities were before us, that there were not enough people coming out of the academic programs that would have the thrust and impetus to follow into the water research and resources area. Is this your finding today so far as you have been in the Department?

Dr. BATES. I have not studied this matter, and I would prefer to refer that question to Dr. Renne. My personal opinion on this, from the degree that I have looked at the problem, is that we do not have enough people in this area. I have seen this from the university position.

Mr. WHITE of Idaho. This was the general impression that was received here.

Dr. BATES. That is all I can give you at the present time.

Mr. WHITE of Idaho. I would like to suggest one last thing to you prior to finishing my talk with you, and that is that I am concerned about cooperation not only with these other entities that have been suggested here, but also the agencies of the Department of the Interior. I am thinking about the USGS and what it can accomplish working with some of the land-grant colleges, private institutions or individual groups that have an expertise in this area. I am thinking about underground water surveys. So many parts of the United States have thought for years that their underground aquifers were unlimited, that you could put down wells and forever pump. This they found to be a fallacy. Even in my own State of Idaho where we have one of the biggest aquifers in the United States, the Snake River Plains, we are beginning to find that in certain areas that problems arise not only from having too little water, but too much water, where we continue to irrigate we get to the point that we are creating marshes and alkalai and salinity problems. I would like to suggest to you that in your capacity as an adviser that this be looked at very carefully.

In the water resources research lab that we have at the University of Idaho, it would seem logical that some of these young fellows, graduate students, could be assigned to work with the USGS in the areas of underground water supply.

One last thing. I feel that I want to see this program developed logically. I don't want to necessarily see the big research centers get bigger and the smaller ones get smaller. I think that there should be an effort to keep it on an even keel where the work can best be done in the areas where the problems exist, and I would like to suggest definitely that cooperation with the USGS in their areas be coordinated with the research centers, with the idea of young men or women that are involved in this taking a part with the USGS in some of their underground water and surface waters studies.

Dr. BATES. Let me simply say I agree with you 100 percent in everything you have said.

Mr. WHITE of Idaho. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Roncalio.

Mr. RONCALIO. No questions.

Mr. ROGERS. Mr. Burton.

Mr. BURTON of California. No questions, Mr. Chairman.

Mr. ROGERS. Dr. Bates, one question.

You were questioned a minute ago about the primary problem of water. I believe you referred to distribution. Now the logical conclusion of that would be that there are then areas of definite shortages in the United States.

Dr. BATES. That is correct.

Mr. ROGERS. Percentagewise by States do you have any information as to how many States would be considered as water short and others in abundance.

Dr. BATES. I can certainly get those figures for you. I don't have them in my mind.

Mr. ROGERS. If you could, I would like to have those, and I would also like to have it broken down by geographical areas which I would presume would be more accurate. Without objection, those will be included in the record at this point.

(The material referred to is as follows:)

Water shortage may be defined as the failure of a commonly used source of water supply to meet the water requirements imposed on it. In the United States many cities and regions have experienced water shortages of a temporary or perennial nature. Solutions to the shortage problem, if of temporary nature caused by anomalous natural conditions, may be found in expedient measures such as: temporary reduction of requirements through application of voluntary or imposed restrictions of use, conservation measures, or development of emergency supplies from previously untapped sources. If the shortage problem is perennial and affects a whole region, the solution may be sought through importation of water from other areas. For example, importation of water has permitted the Los Angeles metropolitan area expansion to continue despite the limitations of available local water resources.

When statements are made that the United States has no water shortage problems, it is understandable that confusion arises about the true situation. We can certainly all agree that all water shortage problems can be solved in some way if the cost of the solution is not too unreasonable. Communities and regions faced with perennial water shortage threats should be aware of their predicament and should be planning to increase their supply of water several years before it will actually be needed. Thus, in analyzing national water shortages it is advisable to examine first the parts of the Nation that are plagued by perennial shortages even though corrective action has kept the problem from becoming acute up to the present. The perennial water situation in southern California is a very real problem to the State which has wisely embarked on a costly State water project to bring water from the Feather River to the water-short area.

Other regions of the United States also have been faced with the threat of perennial water shortages for many years. Continued growth of the economy depends on the availability of adequate water supplies for population, agriculture, and industry. In recognition of this, the Select Committee on National Water Resources was formed in April 1959 to study the national water situation and determine governmental activities required to insure an adequate supply of water for all needs between 1959 and 1980. Under the direction of the select committee several water resource agencies of the Federal Government participated in the study leading to publication of the most comprehensive analysis of the supply-demand situation ever made. The Geological Survey of the Department of the Interior, for example, analyzed and reported on the water supply of the United States in streams and underground. The Survey's water supply statistics by regions were the basis for the comprehensive study of the supply-demand situation prepared for the committee by Dr. Nathaniel Wollman.

In his report Wollman emphasized the perennial nature of regional water shortages in an introductory paragraph:

"The United States faces a number of serious water problems whose immediacy and gravity vary from region to region. In some areas they could become quite painful. Although the restraining effects of a limited water supply will soon become more noticeable in various parts of the country, the re-

gions in which shortage will be severe have, for the most part, been aware of the fact for some time."

Wollman examined the situation as of 1954, 1980, and 2000 with respect to water supply and demand in the 22 water resource regions defined by the select committee. He postulated that "a region can meet all requirements for water provided its supply is equal to or more than the sum of losses incurred from use plus the amount of flowing water needed for waste dilution in order to assure a specified content of dissolved oxygen in its streams."

The Wollman study showed, for example, that the Upper Rio Grande-Pecos region was as of 1954 in the shortage category in that the average regional water supply was less than the regional water demand and that many appropriation rights for irrigation water could not be satisfied. The summary statistics on the supply-demand situation reported by Wollman are provided in the following table from the report of the Select Committee on National Water Resources (S. Rept. 29, 87th Cong., 1st sess.).

Summary of remaining flow, withdrawals, consumptive uses and losses, flow requirements for pollution abatement, and existing and additional storage requirements by water resources, 1954, 1980, and 2000

Water resources regions	1954				1980			2000		
	Longtime average remaining runoff	Withdrawals	Consumptive uses ¹	Storage for all purposes	Withdrawals	Consumptive uses and additional losses ²	Flow ³ needed for pollution abatement	Total water required	Additional storage required	Flow ³ needed for pollution abatement
EASTERN										
New England	Billion gallons per day 67.0	Billion gallons per day 6.3	Billion gallons per day 0.37	Million acre-feet 9.0	Billion gallons per day 18.0	Billion gallons per day 1.5	Billion gallons per day 12.7	Billion gallons per day 14.2	Million acre-feet 3.4	Billion gallons per day 16.9
Delaware and Hudson	32.0	14.8	.63	3.1	35.8	2.1	11.7	13.8	6.1	16.7
Chesapeake Bay	52.0	7.2	.29	9.0	20.8	1.5	22.5	24.0	11.2	26.9
Southeast	212.0	11.2	1.91	16.4	39.2	19.4	56.0	75.3	28.0	66.8
Eastern Great Lakes	440.0	11.2	.40	.5	32.5	1.8	14.0	15.8	8.5	26.0
CENTRAL										
Western Great Lakes	442.0	12.9	.59	1.2	38.0	4.3	31.9	36.2	34.0	51.2
Ohio River	110.0	22.0	.72	5.7	67.2	2.2	17.2	19.4	10.1	29.4
Cumberland	17.0	.1	.03	6.4	.5	.2	7.5	7.7	3.3	9.0
Tennessee	43.0	3.6	.13	15.0	11.7	.5	23.9	24.4	6.4	23.6
MIDDLE WESTERN										
Upper Mississippi	62.0	8.5	.56	4.3	22.5	5.1	25.3	30.4	14.0	21.8
Lower Mississippi	49.0	4.4	1.40	4.5	8.7	9.5	12.7	22.2	15.8	22.6
Upper Missouri	19.0	28.0	13.97	74.8	38.9	29.2	4.4	33.6	30.0	22.6
Lower Missouri	23.0	1.3	.13	1.2	2.6	.4	3.2	3.6	3.6	11.0
Upper Arkansas-Red	11.0	8.4	3.96	7.3	12.1	5.3	2.6	7.9	8.0	3.3
Lower Arkansas-White-Red	77.0	3.8	1.38	26.8	7.1	4.0	12.9	16.9	20.0	4.6
Western gulf	46.0	22.8	10.00	11.2	43.0	20.5	20.4	40.9	34.0	20.9
WESTERN										
Upper Rio Grande and Peecos	(6)	8.9	5.10	3.3	10.3	6.3	1.0	7.3	7.4	3.6
Colorado	3.2	26.7	15.70	35.1	27.6	17.1	2.2	19.3	14.5	4.5
Great Basin	3.7	12.6	7.35	4.1	13.0	10.9	1.2	12.1	6.5	1.7
Pacific Northwest	143.0	24.8	12.70	28.9	35.0	13.9	28.9	42.8	19.2	28.0
Central Pacific	47.0	50.0	27.90	16.4	60.2	30.7	13.8	44.5	31.0	24.6
South Pacific	.36	10.8	4.19	1.8	19.4	4.0	6.3	10.9	5.6	11.4
United States	1,100.0	300.3	109.5	278.0	559.0	190.4	332.2	523.2	315.6	446.5
										442.2

¹ Consumptive uses or losses for agriculture, mining, manufacturing steam-electric power, and municipal use.

² Projection of items in note 1 plus increase over 1954 in losses from land treatment and structures, and from swamps and wet lands for fish and wildlife.

³ Streamflow required to maintain 4 milligrams/liter dissolved oxygen under minimum cost program, except in regions of water shortage, where minimum storage program is used.

⁴ Runoff from U.S. portion only considered as available to meet U.S. needs.

⁵ Storage required to fully develop runoff.

⁶ Present appropriations exceed supply.

In addition to the Rio Grande-Pecos region (in short supply as of 1954), the report shows that four additional regions—Upper Missouri, Colorado, Great Basin, and South Pacific—would be short of supply by 1980, and by the year 2000 the western Great Lakes, upper Arkansas-Red, and western gulf regions would also be in the shortage category.

Droughts may seriously affect normally water-abundant portions of the United States east of the Mississippi River. Because such occurrences, resulting in failure of previously adequate sources to meet the water demands expected of them, are unexpected and may not be anticipated in the planning of waterworks, the effects may be severe. For example, in the southeastern drought of 1954 many small communities were forced to haul water supplies by truck when their normal supply dried up. The current northeastern drought has been associated with water shortages affecting cities ranging in size from small communities of a few hundred people to New York City.

The September 7, 1965, report "Reappraisal of Drought in Northeastern States," prepared by the Water Resources Council for President Johnson, included a summary of community water supply shortages. As reported, water use restrictions were in effect in New York City, Philadelphia, northern New Jersey, and in "some 23 areas outside the Delaware Basin water service area." In terms of the number of people affected by the water shortage the northeastern situation certainly ranks high on the list of important water problem areas.

Mr. ROGERS. Mr. Aspinall.

The CHAIRMAN. Mr. Chairman, thank you for recognizing me at this time. I have read the Secretary's statement in full. I don't know whether you wish to comment on any part of the statement or not, Mr. Carver, but the Secretary has this statement at the bottom of the page, page 1:

Difficult problems face the Nation in providing increased water requirements for recreation and wildlife and in the development of new technology to maintain the quality of water in our lakes and streams, and in preserving the beautiful waterways with which this Nation is endowed.

Is it your understanding that a part of the operation of the Office of Water Resources Research is to study the beautification of waterways?

Mr. CARVER. No, sir.

The CHAIRMAN. Is that what the Secretary means here?

Mr. CARVER. I am not able to amplify his statement, Mr. Chairman. I do not have that view myself.

The CHAIRMAN. Some of us go to New York and we like to come down the Hudson and see the fine skyline. Then I suppose there are others who would take the skyline away from New York and would leave only grassy banks and so forth, if possible. As I read this statement I was trying to figure out what the Secretary had in mind as he refers to the beautification program, which all of us support, at least to a certain degree. He brings it into the Office of Water Resources Research.

Mr. CARVER. I am only speculating, but I think the Secretary may have had in mind that research would perhaps enable us to have remaining some areas which would not have to be developed or otherwise committed to some specific use, but I don't know.

The CHAIRMAN. That activity is to be taken care of in the water planning operations.

Mr. CARVER. Yes, sir.

The CHAIRMAN. I can't tell from reading through this list of contracts whether we have any contracts directed directly to the beautification of a water channel or not. That is one of the questions I am going to ask Dr. Renne this afternoon.

The Secretary said at the bottom of page 3:

We cannot afford to skip on the basic and applied research which may save literally billions of dollars in construction costs over the next decade.

He makes this a part of his statement. He takes it from the 1962 letter that was submitted to the Congress on this legislation. What I would like to know is what is the Government rule that we cannot afford to skip on basic and applied research.

How far does applied research go in any sort of a program like this program? You don't have that?

Mr. CARVER. I don't have that, Mr. Chairman.

The CHAIRMAN. Over on page 5 of the Secretary's statement, beginning with the last sentence on page 4:

Very little work has been done in urban hydrology. Yet this is one of the foremost problem areas needing study.

Urban hydrology, is urban hydrology a different subject? Maybe Dr. Bates wants to answer this. Is it different than rural hydrology?

Mr. CARVER. I get very few opportunities to display the benefits I have received from going to these conferences but I did attend one at Cornell where they discussed urban hydrology. I gathered that where you have got large areas under pavement or paved and so on, that the managing of the water for disposition of sewage at the same time as you are managing it for taking care of flood runoff and so on, constitutes an area for study, an area of study which is getting some additional attention.

Generally we have used the same conduits to take care of flood runoff as we have with human waste, and we sometimes therefore pollute the very water that we want to use or run through our distribution systems. So I do think it is a problem area, from what I have been told. Perhaps Dr. Bates would want to answer further.

Dr. BATES. I would go along with that and say it is simply a different system that you are involved with, because you don't have the seepage down through the soil the way you do in the rural areas, and so you have entirely different underground pattern of water distribution.

The CHAIRMAN. You have these installations in rural areas as well, a large airstrip that we can find many different places 20 miles removed. That is not necessarily in an urban area.

Mr. CARVER. I think that the distinction would be that it wouldn't have to be in an urban community to be an urban hydrology type problem. If you had a big airfield why that would obviously be a problem of urban hydrology even if it wasn't in a city.

The CHAIRMAN. Let's go on to the next sentence and have you explain that:

"There are many regions of the Nation faced with water problems that demand a multidisciplinary approach for optimum solution."

Mr. CARVER. I don't usually write that kind of sentence myself, Mr. Chairman, and I couldn't comment on it.

The CHAIRMAN. Well, I didn't know. You have got me because I can derive most anything that is built today with that sentence.

Mr. CARVER. Thank you very much.

Mr. ROGERS. Any other questions?

Mr. White?

Mr. WHITE of Idaho. One other point that has been raised here of course at this hearing this morning is national responsibilities and international responsibilities. Something that occurred here when we had the central Arizona project before the committee was that the Secretary made a definite statement as to national obligations with respect to the International Treaty of Water Obligations to the Republic of Mexico. This interested me very much, because then the water that is in New York or in Vermont or in Minnesota is obligated to furnish water under this international treaty.

Do you feel that this is a correct expression of international obligations and national obligations of water supply through treaty arrangements?

Mr. CARVER. If I recall the Secretary's statement and it is only in a general way, I am sure what he had in mind was that an international commitment constitutes an obligation of the United States of America, just speaking generally. But I don't think he had in mind that the honoring of this obligation would be spread out on kind of an equal basis across the country or on any other formula basis.

It is just that the United States has to honor its promises some way, whatever way it can work them out.

Mr. WHITE of Idaho. I think I go a bit farther than that, Mr. Secretary. It seems to me that the Secretary of the Interior was saying that in the study of importation of water, that this is one of the areas of obligation, that it wasn't necessarily that of a drainage or to a basin, but should you be unable to fill that obligation from a basin, then some other basin would be obligated to supply the water for that international obligation, is that correct?

Mr. CARVER. Well, he may have had that in mind. Of course when you get into the field of international law, you have got the question of what happens if you don't.

Mr. WHITE of Idaho. Well we already have lots of don'ts as far as the supply of water information.

Mr. CARVER. I suppose it is the United States and the Congress who decide whether they are going to authorize other ways of doing it than from the specific basin that was in mind when they started.

Mr. WHITE of Idaho. I will have to say, Mr. Secretary, I read a little bit more into the statement made by Mr. Udall than you are interpreting. Thank you.

The CHAIRMAN. Mr. Chairman.

Mr. ROGERS. Mr. Aspinall.

The CHAIRMAN. If you have a minute for our own edification as we prepare to talk with Dr. Renne, we have a word here in a contract that was let and I wish our good friend General Haley was here to answer the question, but I would like to know from Dr. Bates what kind of study is this "factors affecting accelerating eutrophication of Florida lakes."

Dr. BATES. Eutrophication is the word that has been applied most recently to Lake Erie, where, because of the pollution that is taking place all around the borders of it, a certain part of that lake is essentially becoming dead as far as the fish life and other organic materials, plants and so on. It is not supporting the ordinary fish life of the lake. This is the easiest way I can explain it to you, the word eutro-

plication is simply pollution moving in to the point where it is causing a death of the lake.

Mr. CARVER. I would like to say, Mr. Chairman, I am glad you didn't ask me that question.

Mr. ROGERS. Thank you very much, gentlemen. The subcommittee will stand in recess until 2:30 this afternoon.

(Whereupon, at 11:45 a.m., the subcommittee was adjourned, to reconvene at 2:30 p.m., of the same day.)

AFTERNOON SESSION

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for further consideration of pending business.

In order to accommodate some of the witnesses who are a long way from home, the Chair is going to recognize at this time Dr. W. E. Morgan, president of the Colorado State University, and members of his panel which I understand include Dr. William P. Tolley, chancellor of Syracuse University, and Dr. Eric A. Walker, president of Pennsylvania State University.

Dr. Morgan, if you will come forward we will recognize you.

STATEMENT OF DR. W. E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY; DR. WILLIAM P. TOLLEY, CHANCELLOR OF SYRACUSE UNIVERSITY; DANIEL F. JACKSON, PROFESSOR OF CIVIL ENGINEERING, SYRACUSE UNIVERSITY; AND DR. HAROLD G. WILM, ASSOCIATE DEAN, COLLEGE OF FORESTRY, DIRECTOR OF WATER RESOURCES INSTITUTE, STATE UNIVERSITY OF NEW YORK

Dr. MORGAN. Mr. Chairman, this is Chancellor Tolley on my left.

Mr. ROGERS. You may proceed, Doctor.

Dr. MORGAN. Mr. Chairman and members of the committee, my name is William E. Morgan. I am president of Colorado State University and am here in my capacity as chairman of the Water Resources Committee of the National Association of State Universities and Land-Grant Colleges. I appreciate the opportunity to appear before this committee to express the association's interest in S. 22 and in H.R. 3606 and companion bills.

Until conflicts in our schedules that arose yesterday and today it had been planned that there would be with me representatives of three universities, one of which, a private institution, is not a member of the association I represent. The latter person named is William P. Tolley, chancellor of Syracuse University, who is here today, and I shall make explanation in a moment of the difficulties involving some of the others.

With Chancellor Tolley available in the audience for call, if it is permissible, to assist him in some questions, possible questions, are two other university members, first the associate dean of the College of Forestry and director of the Water Resources Institute of the State University of New York—both of these are elements of the State University of New York and are located in Syracuse—that person is

Dr. Harold G. Wilm. The other person from the Syracuse University staff, is a professor of civil engineering, Daniel F. Jackson.

The second university representative scheduled for our panel presentation was to have been Dr. Frederick P. Thieme, who is the acting president of the University of Washington. As I think may have been reported to you by Congressman Foley, Dr. Thieme is in the State of Washington today with Mr. Foley instead of here. This is word that reached me yesterday. He will, however, have a statement to file with you, and I believe Mr. Foley has assured him that the record would be kept open for him to get his statement in to you, sir. At least that was my understanding from the telephone conversation.

Also a casualty on the travel schedule has been the chancellor of the University of Texas, Chancellor Henry Ransom, and/or the vice chairman of the Board of Regents of the University of Texas, Frank Irwin. Neither of them can be present today.

The final member of our panel, Eric A. Walker, president of Pennsylvania State University, was scheduled to arrive this afternoon. By agreement with the committee staff, I telephoned him at 12 noon with the suggestion that there probably would not be time to hear him today, and with your consent he would like to appear tomorrow if he can possibly make it. He reports that he has a building dedication at York, Pa., at noon tomorrow and hopes to be available shortly thereafter. In that connection, I should like to, in making reference to President Walker, indicate that he will be able to give you a definitive answer to one of the questions that was put this morning from the committee having to do with the status of trained manpower in some of the scientific lines. As you may recall, there was a line of questioning about that this morning. Dr. Walker is Chairman of the National Science Foundation Manpower Requirements Board—I hope I have that name correct—and he is up to the minute on the status of the availability of scientific manpower in all the various categories, and he will be available to give you tomorrow a very definitive answer to some of the questions that were asked this morning.

The National Association of State Universities and Land-Grant Colleges consists of 100 State and land-grant universities and colleges located in the 50 States and Puerto Rico. Member institutions grant more than one-fourth of all baccalaureate degrees and substantially more than half of all doctoral degrees in the United States. My appearance here today is authorized by a resolution adopted at the association's annual meeting November 17, 1965.

Your committee very generously provided time for extensive testimony by me and other representatives of the association in September 1963, on bills which resulted in enactment of Public Law 88-379, the Water Resources Research Act of 1964. In those 1963 hearings, the association's panel of witnesses discussed in considerable detail the need for legislation to authorize support for university-based research in order to bring the competence of academic scientists to bear on solution of water resources problems, many of which are already in the category of the truly urgent. The report of the committee, House Report 1136, 88th Congress, set forth an exceedingly lucid summary of the magnitude and complexity of water problems, of the need for increasing research effort to discover new and improved means for

dealing with those problems, and of the desirability of adding independent university effort to that of the research by Federal agencies.

Being well aware of the committee's knowledgeable understanding of these matters, and to conserve the committee's time, Mr. Chairman, my colleagues and I will not cover those subjects again in the hearings today. It is hardly necessary to add, however, that in 1966 water resource problems throughout the United States are as numerous and as baffling as they were in 1963, and the need for research to find ways of dealing with them is as urgent now as it was then.

In order to condense our testimony and to avoid repetition, each of the four of us will talk about different aspects of the need for a title II program such as would be made possible by enactment of the bills you are considering. We have divided up the main points as follows:

1. I will discuss title II principally from the viewpoint of the universities at which are located the water resources research institutes that now receive support under title I of the act.

2. Dr. Thieme—and, sir, that is, in his written testimony because he will not be here for questions, although I hope we can field some of the questions that might be directed to him—Dr. Thieme will discuss title II principally from the viewpoint of public universities that are not the location of title I water research centers.

3. Chancellor Tolley will discuss title II from the viewpoint of private universities.

4. President Walker will discuss the need for utilizing the research competence of all of the universities in a State in order to deal with water problems of the State.

Before speaking on the specific aspect assigned to me, I should emphasize that the association has acknowledged by appropriate resolution that the title I program is making excellent progress. We are impressed by the large number of highly qualified academic scientists and engineers who responded so promptly to the opportunity to undertake research on important water problems. We are gratified by the support of public officials in the States and by the interest of citizen organizations and others. We feel that the Department of the Interior administers the program with vigor and prudence; with understanding of the problems of university scientists. We strongly endorse continuance of the title I program to the full extent of the authorization.

However, the program funded by title I is subject to certain built-in limitations that inhibit development of the comprehensive research effort called for to meet the complex pattern of State and National needs. For one thing, the institute university seldom possesses faculty research competence available in all of the scientific and engineering disciplines that are needed. Customarily, strong programs in some of the disciplines exist at one university in a State, and other subjects are strong at another university. This means that the research program at the institute university inevitably will be directed toward some aspects of the State's water problems but not to others. For example, it may focus on ground water hydrology or water quality chemistry to the neglect of water law or economics because this fits the pattern of institutional faculty strength.

It is true, of course, that the present act permits and encourages universities other than the ones at which the research center is located

to participate in the research at the center and thus make use of a more diversified inventory of research competence. To some extent such arrangements are in effect in several States. In my own State of Colorado, for example, the noncenter University of Colorado participates in research of the center at Colorado State University. I am pleased to say that the two universities have a very fine relationship in this as in several other kinds of collaboration. At best, however, this participation arrangement is less effective than would be a title II program.

One reason for this is that the allotment funds to a center—a maximum of \$100,000 per year—is sufficient to constitute one critical mass but not two, if I may employ an analogy drawn from atomic physics. The allotment as had been intended by Congress provides for “one water resources research institute in each State.” While it does furnish seed money and a sustained base of support for one university, the allotment can hardly be stretched simultaneously to do more than furnish limited and intermittent seed money at a second.

Another difficulty which limits the effectiveness of the participation arrangement is the cumbersomeness and expense of the effort required at one university to coordinate or supervise research by faculty members located and working at another university. Moreover, the fiscal and administrative work of handling funds for payroll, purchases and field expense through two university business offices diverts staff time that might be put into the substantive part of the project instead of ministering to the project.

As a consequence of experience reported in a number of States, it seems clear that the title II proposal before you is needed in order to insure economical utilization in well-rounded water resources research programs of the diversified scientific and engineering competence available in all of the universities of each State.

In addition to those points about title II as seen from a center university, we recognize that highly competent research capability is to be found in nonacademic organizations. For the solution of certain kinds of water problems, nonacademic research institutions, engineering firms, and others possess highly developed competence of different kinds than that to be found on a university campus. The witness list indicates that representatives of such organizations will testify, and I will not attempt to cover that matter further.

Mr. Chairman, each of us on this panel will very gladly attempt to answer questions from the committee. However, I suggest it may save time if each of us completes his statement and then responds to questions on anything not covered adequately. If that is agreeable to you, the next member of our panel is Dr. Tolley, chancellor of Syracuse University.

Mr. ROGERS. Yes, Dr. Tolley, unless any of the members of the subcommittee have any questions at this time. If not, Dr. Tolley, you may proceed.

Dr. TOLLEY. Mr. Chairman, honorable Members of Congress, I am William P. Tolley, chancellor, Syracuse University, Syracuse, N.Y. It is a privilege to speak to this subcommittee on the relationship between private universities and the Federal water resources program.

Dr. Morgan and I are both very grateful for the special consideration you have given to us for our personal schedules.

Water is a complex and important resource that has been studied for many centuries. Thales, in 600 B.C., suggested that water was the ultimate substance, the first principle of all things, their original form, their final destiny. Since that time it has been studied by many men in many countries, yet the stubborn fact is that still too little is known of its proper use and control or its proper management as a national resource.

As more knowledge is developed on water as a resource and geologic raw material, it often serves only to emphasize the need for developing still more knowledge. The need for this knowledge is increasing more rapidly than the development of industrialization and urbanization. The need outpaces the cause. Industrial and urban growth have forced even water-abundant areas to reevaluate their actions and to develop concern. Misuse of waters in and near densely populated communities has resulted in the loss of these waters for boating, fishing, and swimming. Degradation of our waters is associated with the lack of a sound water resource management program. The full facilities of all universities, private industry, governmental agencies, and indeed every knowledgeable citizen need to be utilized to develop a national water resource management program. The range of the problem is extensive and includes almost all disciplines.

Engineering, bacteriology, geology, limnology, hydrology, oceanography, water administration, water economics, and water law have been associated traditionally with water resources development. Other academic areas not usually associated with water also have much to contribute to the study—sociology, geography, anthropology, political science, and psychology are examples of these.

Many of these disciplines are common to most universities. Several are limited to fewer schools. They are not limited to public universities, private universities, or land-grant colleges. Talent is where you find it. There are approximately 1,150 officially listed colleges and universities in the United States. Of these, 770 are privately supported; 380 are publicly supported. This gives a ratio of private to public of 2 to 1 and a ratio of non-land-grant colleges to research-supported land-grant colleges of 23 to 1. Thus less than 5 percent of all universities in the United States are currently receiving financial support under this law. A large number of the remaining 95 percent have great competence in water resources. Those with most competence are distributed throughout the United States in public, private, and land-grant schools. But no one group has a dominant talent. Full opportunity should be given for private universities to receive research support allocations and thereby to include, in some areas, the best talent. Gentlemen, to do otherwise would be a failure to use a major national resource.

Federal funds from title I of the water resources bill have stimulated some new programs and encouraged new institutions to become interested in water resources. Research extended to more educational institutions usually expands the base for public support and action in water resources programs at local, State, and Federal levels. On the other hand concentration of research in a limited number of establishments hinders public understanding, limits the extent of the work, and delays completion of programs. The increased Federal funds to private and public institutions would stimulate the spending of

additional money by universities, local, and State governments for water resources programs.

The participation of internationally recognized private universities in Federal funding of water resources centers is restricted under the operation of the present law. This method of operation eliminates from the program some of the best laboratories and the most competent men with recognized abilities. Stanford, Northwestern, Harvard, Johns Hopkins, Brigham Young, Pittsburgh, Miami of Florida, Rice, and my own institution, Syracuse University, are but a few of the many private universities with excellent personnel and facilities that should be encouraged to participate in this water resources program if it is to achieve the objectives sought by Congress for the national welfare.

In November 1965, the citizens of New York State passed a bond issue 4 to 1 amounting to \$1.7 billion for water pollution control. There is, however, a major problem in implementing this program since there is a major shortage in the number of trained engineers and scientists in New York State to conduct this program. Only through the integration of the private universities into the Federal water resources program can the necessary manpower be trained and made available to meet demands such as this.

In order to accomplish this end the present inadequate authorization of funds under title II should be increased significantly and the approval of individual grants should be handled as provided under title I. These objectives would be satisfactorily met by House approval of S. 22 as passed by the Senate last year, or of the House companion bills introduced by Congressman O'Brien and Congressman Hanley.

Thank you very much.

Mr. ROGERS. Thank you very much.

Dr. Morgan, let me ask one question and then I will recognize the chairman for questions.

What has been the research program in this field for the last 20 to 30 years? Has there just been none or has it been inadequate?

Dr. MORGAN. I take it, sir, that your question is general.

Mr. ROGERS. Yes.

Dr. MORGAN. For the United States. The land-grant institutions, of which there is at least one in each State, have from the very beginning of those institutions, which means that for most of them this is a period of 60 years or longer, been engaged in resource-oriented research that was both applied as the term was used here this morning, and basic. Principally applied research, I suppose you would say, for the reason that most of the research conducted at these experiment stations was aimed at the solution of problems that were immediately facing the people in the State.

Now, when I say these research programs were resource oriented, I mean that, while they varied in emphasis from one State to the next, all of them dealt with soil, water, people. Of course people are a resource and have long been so recognized by the land-grant institutions. And so the first part of my answer to your question would be that the land-grant institutions across the land have been engaged in a very diversified program of research, many aspects of which touched the problems of utilization of this important resource of water.

Now, the second part of the answer I would I think give to your question would have to be particularized say to one institution, the one I am most acquainted with, although it should not differ significantly from the experience at other institutions. I live in Colorado; we are an arid State. From the beginning of statehood, water was recognized as one of the quite limiting resources that we had to depend on in order to extract a living from the total resources in that State, whether we be engaged in mining or farming or manufacturing or transportation or service industries or what not. And so in our State the research program at our institution has been very heavily oriented toward the problems of water production, utilization, transportation, efficient use and so on in all of its manifestations, domestic use, urban and industrial use, and agriculture.

But in the very early days of our history in our State, water being under our State law and under our constitution a resource in which certain property rights might be established and maintained, almost chattel subject to sale, the right to use it subject to sale——

Mr. ROGERS. Doctor, What I am interested in is what has triggered this great demand in the last few years for the Federal Government to take a role in this research that is many, many times the research that has been done in this particular field for many, many years in this country.

Dr. MORGAN. Well, my answer to that would be that the American people, shortly after we settled into what might be called the post-World War II period, began to take a long look down the road, down many avenues, and as we considered in this country the problem of long-range planning for highway construction, for the development of parks and recreation, waterways, water resources, among the things that emerged out of this historical concern for where we would be a few years from now in the light of rapidly increasing populations, was some rather startling information concerning the two principal questions. One, from the way we were currently utilizing it, it looked as if we would run short on water in some areas, and in the Nation as a whole. And, secondly, there was this enormous increase in the concern for water quality, the whole problem of water pollution, and then there were these ancillary interests that had to do with recreation and wildlife and so on.

And so if I have understood what you are getting at in this question, this was a concern of the American people which manifested itself in the Congress of the United States by an inordinate interest in the whole subject of long-range planning for the utilization of our resources, for some of which the end seemed to be in sight.

Mr. ROGERS. I gather from your answer then that you feel that this is only an integral part of a great awakening that mankind has gone through, and the need for planning for the future rather than taking the matter on a day-to-day basis, and that it not only requires future planning, but it requires it on a nationwide basis rather than on a local basis.

Dr. MORGAN. Yes, sir; I would agree with that, and wish I had stated it.

Mr. ROGERS. Thank you very much.

Mr. Aspinall?

The CHAIRMAN (Mr. Aspinall). Mr. Chairman, I wish to thank the witnesses who are now before us. Dr. Morgan happens to be my constituent. Regardless of that fact, I would let his associates know that he has been very attentive to his responsibilities in this field ever since last year. Not a month has passed when he has not asked me when we were going to get to this new title II, and that is what constituents are for, and I hope that he recognizes the fact that that is what Congressmen are for also.

Following through with what the chairman has just said, someplace in our statements is a statement to the effect that the first research program in water was about 600 years before Christ. I thought it was Dr. Bates' statement, but I cannot find it right now. Is it in Dr. Tolley's statement, too? All right, perhaps it was two or three of you. Yes; it is in Dr. Tolley's statement also. I was hunting for that while he was making the statement.

Now, just why is it that this great upsurge, the programs having been going on for about 2,600 years, has suddenly developed in the last 18 months, and how much interest would you gentlemen—and this is the question—representing the schools that you do or the associations which you have, how much interest would you have in this if it were not for the fact that Uncle Sam, the Federal Government, is putting up the necessary money to fund these programs? You have to keep in mind, of course, the fact that even though this has been such a vital subject for 2,600 years, and people should have been interested in it, we have had so few institutions who were willing to make it a part of their work, and so few philanthropists who have seen fit to finance it. Either one of you or both of you, after listening to this double-barrel question, can perhaps answer.

Dr. TOLLEY. Let us both try it. In the first place, I think this is true in a good many sectors of life that the research effort has been an effort of the last 20 or 25 years, and when you have an advance technology, it influences all the supporting disciplines.

The CHAIRMAN. Let me understand now.

Dr. TOLLEY. You introduce the use of DDT in a forest, and what you did not anticipate was what the effect would be on other living organisms, you see. Then you are forced to think about it, and usually our thinking comes after the fact. What you have now is a tremendous waste water problem as well as a water supply problem in all of our urban and industrial areas. What you have is a steady degradation of the lakes and streams, and increasing pollution, and what you have now is a sudden awareness that perhaps we ought to take a hard look at our forest lands and see what we are doing to protect our watersheds.

And then we have an inadequate supply of trained people. Now when you get this combination of factors, university administrations begin to wake up.

Mr. RONCALIO. An inadequate supply of what?

Dr. TOLLEY. Trained people.

The CHAIRMAN. Doctor, you did not mean the overall statement that research has only developed within the last 26 years.

Dr. TOLLEY. Oh, but I do. I think that research in this country really began with the chemistry patents from Germany after World War I.

The CHAIRMAN. In what field? Are you talking now just about water or about everything?

Dr. TOLLEY. I am saying that the research revolution in America is a relatively recent revolution.

The CHAIRMAN. Financed at Federal expense I would agree, but not research as research, because we have carried this on continually since the beginning of time.

Dr. TOLLEY. Universities as research enterprises really got under-way when Hopkins started really a new type university, and then Yale and Harvard followed the example and became equally strong research institutions. But you take a look at graduate enrollments. In 1900, 5,000 graduate students in all of America. You cannot honestly say that in 1900 you had great research institutions in the United States.

The CHAIRMAN. I would say if you mean at Government expense or at the expense of philanthropists—

Dr. TOLLEY. We could not be more grateful to the Federal Government for recognizing the importance of research.

The CHAIRMAN. Of course, that comes then to my next question, and before I ask the next question I will preface it with this. No greater water problem has ever been on the face of the earth than the one between 600 and 400 or 300 B.C., when the Tigris-Euphrates Valley dried up and civilization went by the wayside. Now, does history not record any scientists at all being interested at that time?

Dr. TOLLEY. Do you know of any?

The CHAIRMAN. No; I do not know of any. I am asking you.

Dr. TOLLEY. Of course I am a philosopher, you see, I am not a scientist. I am the most ignorant man in the room.

The CHAIRMAN. You see, I am a legislator. We meet on common ground. We have to have Dr. Morgan come to our help as far as that is concerned.

Dr. TOLLEY. That is right. Now Dr. Wilm or Dr. Jackson might answer that question. They may know somebody back in 300 B.C.

The CHAIRMAN. I still go back to the question where would you be if it were not for the Federal Government coming in at the present time? Would you be accepting the challenge without Federal contributions, in order to find the answers to these questions?

Dr. TOLLEY. If you are saying have we come in in the last 18 months, the answer is, we have been in long before that. Since 1958 one department alone, the Department of Civil Engineering at Syracuse, has produced about 50 graduate engineers in the field of water resources, you see. This is not an 18 months deal. And at the present time we have the following departments with basic and applied research in water resources: geology, zoology, bacteriology and botany, economics, geography, chemical engineering, silviculture, pulp and paper technology, civil engineering, political science, and the Syracuse University Research Corp.

The CHAIRMAN. I was very chagrined not to find beautification in that list.

Dr. TOLLEY. Well, it is not there but there are 10 departments offering specific courses relating to the water resources program, and there are 22 professors conducting studies in water. You see, this means that we did precede title I.

The CHAIRMAN. I know that some universities have, but I know that this great surge of interest in the last 18 months or in the last year can more than likely be traced to the fact that everybody wants to get into the program now that Uncle Sam is willing to finance at least a part of it.

Dr. TOLLEY. You ought to be very grateful that you did sponsor something the need for which was clearly apparent. The very fact that in New York State we could pass a billion dollar bond issue 4 to 1 indicates that in a sense it was overdue.

The CHAIRMAN. You would not say that this legislation has very much to do with that action.

Dr. TOLLEY. Not at all, but I think the response—you are talking about public response to your measures—the public is ahead of us in this respect. They are not well informed, but they are ahead of us in their concern.

The CHAIRMAN. That is a good statement for legislators, because that helps build the foundation upon which we can tie this legislation. I am glad for the response. But I will be happier when I can evaluate some of the results, and the committees which the Secretary chose, composed of eight distinguished Americans—there are only three or four scientists but they are all distinguished Americans—said that they could not evaluate these contracts as of the present time or the results of the contracts. You see, what we are trying to do is to get testimony upon which to found an increased program over and above that which we are presently furthering.

I will go to come direct questions.

Dr. Morgan, in your statement you state: "It is hardly necessary to add, however, that in 1966 water resource problems throughout the United States are as numerous and as baffling as they were in 1963 and the need for research to find ways of dealing with them is as urgent now as it was then."

I suppose you mean by that that we have more problems, even though we started a program, and that we will continue to have more and more problems. It was the testimony this morning, as we research these problems, there will be more problems that develop, is that right?

Dr. MORGAN. Well, I think with just the normal evolution of society into a more crowded and possibly more complicated life, that some of the existing problems will be solved, some will grow more urgent and more persistent, and new ones will develop.

This is a generalization that I think can be supported by this general statement. But to get down to specifics, the annual report of the Office of Water Resources Research which lists by States the individual project titles gives one a very good idea of the wide variety of problems that are subject to analysis by scientific effort. My familiarity with the list of course is limited largely to that in the region I come from and the State I come from.

The CHAIRMAN. Doctor, I noticed as I went through this list that Dr. Renne has given to us many instances where we are doing research work in this program on water law within a State. Don't you think that is going pretty far away from the kind of research that this program envisions?

Dr. MORGAN. Mr. Aspinall, not as I understood the intention of the act. This matter of water law is one that varies according to the State.

The CHAIRMAN. Oh, yes; we know all about that, but why should the Federal Government finance an activity to find out what a State's water law is?

Dr. MORGAN. Well, I will read from the act what was intended to be done. The Congress sets up the definition of the kind of inquiries that may be supported by the funds that you authorize.

Such research, investigation, experiments, and training may include without being limited to aspects of the hydrologic cycle, supply and demand for water, conservation best use of available supplies of water, methods of increasing such supplies, economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems.

The CHAIRMAN. You are going to throw us attorneys all out of business.

Dr. MORGAN. I am sorry, I didn't get that.

The CHAIRMAN. You are going to throw us attorneys all out of business. I know I prided myself on irrigation law when I went to school, and have since then. Now you come along with a water research program that states that you can spend Federal money in order to interpret State law as it has to do with water and water rights. Anyhow I am not going to press that. It just seems to me that there are bounds or limitations within which we should stay.

Dr. MORGAN. Mr. Chairman, may I respond, sir, with one more comment. One of the projects that involves a study, or rather gets over into the area of water law is a cooperative project between the institution I come from and the University of Colorado Law School, and it is our thought that this inquiry may be very helpful to us in understanding some of what you might call the institutional aspects of water management.

Now we see this as being within the intent of the Congress from this wording that is in this statute.

The CHAIRMAN. That brings me to my next question. Are you in favor of removing the 10-year limitation, the 10-year term provision?

Dr. MORGAN. Mr. Chairman, my interest is more in the size of the authorization, because as I use the term "critical mass" in this testimony, I mean to convey some idea there that there is a minimum limit of funding that you need to have in an ongoing research organization with the ability to perform, as most of these institutions have, or all of them I would say have. There is some minimum amount below which you are not likely to get the mileage out of your dollar that you ought to. So I am concerned with the size of the allotment and with the availability of the allotment, and I myself am not so concerned about the 10-year limitation.

The CHAIRMAN. You see now in Virginia we have a contract proposed which is labeled "6-E, Study of Water Resources Laws for Virginia."

Now if we didn't have a limitation on this requiring very close attention by those administering the program and those in the legislative part of the Government, how could we ever express at least our curiosity and maybe our opposition to such studies within what we thought was to be a little bit different research program?

Dr. MORGAN. Well, it has been my experience that the Congress has ways of expressing its discontent with things. But I certainly agree with you that if there is a time limit prescribed for an authorization, that this automatically brings up on the calendar a reconsideration of it. I have answered as far as I personally am concerned. I find no objection to this. I do think that those who wrote the original statute that a proposed a continuing appropriation had in mind the prospect that for a long, long time to come, as far down into the future perhaps as one would care to speculate, this country would be confronted with problems of the character intended to be researched here, that is to say, water.

The CHAIRMAN. Don't you think that the administering authority and the researchers themselves would do a better job if they had to come before Congress each year?

Dr. MORGAN. Each year?

The CHAIRMAN. Each year, just as you are coming this year and as you will come next year if I am chairman or if the gentleman from Texas is chairman.

Dr. MORGAN. Well, may I qualify my answer by saying it depends on the size of the fragment of research that is to be the subject of congressional oversight. I see the Congress as a policymaking body which lays out the broad policy but gives it enough specific definition to define the amount of money that may be used, and the general parameters or boundaries in which the research may be conducted, such as I have read from the act here, and that the job of administering picks up at that point, and begins to particularize it into a coherent program. And so this becomes both a matter of definition and of relative scale I think, and if we are using the same term—I mean if the term means the same thing to both of us, I would say that the annual defense of a project for conduct of research would really hamper the research administrator if each individual project had to be defended on its own base.

The CHAIRMAN. If we don't evaluate it, who will?

Dr. MORGAN. Well, research administrators don't just run off entirely on their own. They are subject not only to their own conscience, but to public evaluation of what they do. I certainly do not mean to imply in this answer that I think it improper for the Congress to evaluate these things.

I think it is highly proper. But I am saying that in my honest judgment some pretty searching evaluation of the adequacies of a research program takes place within the existing organization for research, and I can start and illustrate it on my own campus to amplify my point.

The CHAIRMAN. Well, we are not going to continue this here. We are going to get out to your campus sometime and meet together, and I will tell you about a few instances where there has been unlimited authority and what has happened, and they have happened naturally, by honest people, sincere people, who have been empire builders and they have been just as sincere in their work as they could possibly be, and yet the programs have gotten away from them.

Why?

Because the appropriating committee doesn't have the time or doesn't have the talent or doesn't have the interest as far as that is concerned to get into the details of some of these programs.

You state—

Before speaking on the specific aspect assigned to me I should emphasize that the association has acknowledged by appropriate resolution that the title I program is making excellent progress.

Will you explain the procedure by which you evaluated what has been done so far.

Dr. MORGAN. Yes, sir. At the association meeting in November, we asked the Department of the Interior to render a report to our water resources committee of the association of the progress that they had made in getting started, if you please, getting cranked up on this very broad program that touches all of the States. It was our judgment—this was in November—that the Office, which had started its operations the preceding July, had made excellent progress. This was based on information from them on how far they had proceeded in establishing their relationships with the States, how far they had proceeded in writing some of the ground rules, some of the regulations—I hope that is the proper term—that would be in force in overseeing the planning and the expenditure of funds in these centers, these campus centers. By the way, we at the university end objected to these regulations in a few instances and had some negotiations with them, so our liaison with the newly established Water Office was prompt and continuous from the time that the Office was organized.

Well, we measured what they were doing there, dealing with 50 States and Puerto Rico, against what we would expect to do on our own campus if we were setting up a brandnew program and having to get all the lines of relationships, administrative and otherwise, established, and it was our judgment they were making excellent progress in setting up the program.

The CHAIRMAN. Of course, I am very pleased that the universities in Colorado have gotten along so well, and I expect that the fine hand of Dr. Morgan helped Texas to get together.

I think this is fine. However, you state:

I am pleased to say that two universities have a very fine relationship in this as in several other kinds of collaboration. At best, however, this participation arrangement is less effective than would be a title II program.

Why is that, and is it solely because of the money, or is it because title II would give more recognition to the other universities?

Dr. MORGAN. Mr. Chairman, I have tried to amplify that in the language that follows that statement by illustrating that to fund a project—we will now talk about Colorado and the institutions you mentioned—

The CHAIRMAN. Of course that is what bothered me, because your explanation went more or less to money only, and if this is true, then why not put more money in the title I operation rather than have a new title II?

Dr. MORGAN. Well, I mentioned the administrative difficulties, and I know that administrators are paid for dealing with and solving administrative difficulties. I don't like to dwell on that point too much, being an administrator. There is this other problem, though, Mr. Chairman, that I think is quite real in some instances.

These institutions in a given State, organized as often they are under different boards of control, with historical records of, oh, let's call it institutional jealousy, makes it especially difficult for the direc-

tor of a research center at the land-grant institution to perform the coordination function that the Congress wants, and that any research administrator wants, because he, too, knows that if he permits unwarranted duplication of effort, that someone is going to call attention to it, and this throws a cloud on the entire effort.

Now it is my own personal view that while this differs from one State to the other, in general a more effective job of coordination, avoidance of duplication, making certain that the research done at the two institutions really aims at problems needing solution—that in general a more effective job of the kind of overseeing can be done from the, if you please, independent Federal office than it could from the organization in the State.

Now I say in general. This I think is true.

The CHAIRMAN. Isn't it a cardinal rule or principle of administration that the fewer bodies you have to administer, the more efficiency that you get? With the State institutes, you have to break it into 51 operations, and what you do here, bringing title II in as it has been proposed, you just permit the Administrator of the Office of Water Resources Research, you just permit an operation that is completely spread out and not associated with each other, with the operation in States or in the National Government, except as the Administrator tries to do away with duplication. Maybe Dr. Tolley wants to answer that.

Dr. TOLLEY. Well, I am not sure that I can answer it, but in New York State we have a very complex situation, where you have a city university with a great many students, you have a State university with some 40 units, and then you have Cornell, which is the only one of its kind which is a private institution, but which happens to be designated a land-grant institution, so for your purposes it is the land-grant enterprise that will run this show.

Dr. Wilm, who is in the audience, has been brought back from the commissionership of conservation of the State of New York to direct the State university water resources institute, and Dr. Wilm, based at Syracuse, where the State college of forestry is, will have a special interest in the watershed problems and the forest problems. But he also will coordinate all of the units of the State university in the matter of water resources, so that all the programs for research and all the different units of the State university would pass through him.

But he must go down on bended knees to somebody at Cornell, as a private institution, to ask for money, and yet he will supervise all the projects in the school of agriculture at Cornell University, because the school of agriculture happens to be a part of the State university.

Now we have a water resources program at Syracuse in the university that involves the forestry college in cooperation, the civil engineering, the Maxwell School, and then we also have a program in water in the research corporation. I am not sure that Cornell is designed to wear two hats simultaneously, one to operate research, and particularly with limited funds, and at the same time to act as if it were a kind of administrator of research for the whole State. It seems to us a very cumbersome system.

The CHAIRMAN. You see, Doctor, if it hadn't been for the fact that land-grant colleges did have and do have what is the dominant talent, regardless of what you state here, there wouldn't be any program.

This was sold to us in the first place because of the experience of the land-grant colleges in the research work in agriculture, and it was the conclusion from the hearings that they were the best ones to take up this kind of research.

Dr. TOLLEY. We are for title I you understand, and we certainly applaud everything the land-grant institutions are doing. We would simply like to see this program extended so that where you have gifted people, as you have, let's say at Harvard, that you made sure that you are tapping these resources.

The country needs it.

The CHAIRMAN. Thank you very much.

Mr. ROGERS. Mr. White.

Mr. WHITE of Idaho. Thank you very much, Mr. Chairman, I think your last sentence, the last statement which you made about capturing these resources, making sure we are using all the best talent, is well taken. The thing that puzzles me though is how many people are going to indicate they have talents in certain areas that may not be any more superior than they have in other areas, simply to get in on a program. I think that is what is bothering the chairman of the full committee, too.

I will have to admit in listening to both of your statements that I have that sense coming through to me, that we want to get on board, we want to take part in the program as institutions rather than as—

Dr. TOLLEY. No, our concern isn't that.

Mr. WHITE of Idaho. I hope not.

Dr. TOLLEY. Our concern is not that our institutions need research dollars. This is not our need. The truth is that the country needs the application of people who have had experience in this field, who have had an interest in this field, and who have talent in this field.

Now in New York State there is a little college called Manhattan. It has a fine program in water. All right, it ought to be in the program. It isn't difficult to find out where these institutions are. The experts who are in this room could probably name most of them without going to any textbook. They could just recite them off. They are found in land-grant institutions, State universities, and small colleges.

I think where we differ, or where we perhaps aren't approaching it from the same point of view, is we think that research is an investment, and that it will pay off, and there will be some mistakes. There will be some projects we can't defend and we shouldn't try to defend them.

Mr. WHITE of Idaho. But they are part of the payoff too.

Dr. TOLLEY. That is right, but it is an investment. Now you didn't solve polio with little spoonfulls of research. When you began to get the massive attack on the problem—I don't doubt that they wasted some money—they finally found the answer to it. We have got very pressing water problems. They affect our survival as a culture. We can't waste any time about it. You have got to spend for research. Our experience at Syracuse is that it has been relatively easy to get limited funds for an applied problem, something that is advisable and easy to understand, but it is almost impossible to get money for fundamental research.

Our primary need I think is fundamental research. What we need is more knowledge.

Mr. WHITE of Idaho. I agree with you that this is the problem, and this is what we are attempting to try and find the answer to here, and with the legislation that is before us to see whether it is needed to go into this area.

This morning I asked a question of a previous witness with respect to the disciplines that are now taught at several of the universities, and particularly your university. I am going to tell you the kind of answer I do not want. I do not want you to give me some of the old basic civil engineering courses or geology courses that have been taught in every university all over the United States. I happen to come from the University of Idaho. I took a course in mining engineering so I know a little bit about those basic courses in hydrology and hydraulics and geomorphology, and so forth, and so I am searching for disciplines that you have at your institution of learning that are in excess of those that are normally taught for completion of a course in mining engineering or civil engineering or for one of the other degrees that are conferred upon bachelor of science students.

Now what other special courses do you have in hydrology other than the ones that I am attempting to refer to?

Dr. TOLLEY. The first thing I would say is disregard the labels and recognize that no matter what the label is in the catalog, that course that is given in 1958 is different from the same course given in 1962, and tremendously different in 1966. In other words, when subject matter is growing so fast, a boy who has dropped out for let's say 5 or 6 years for industrial experience and then comes back to the university, he simply is frightened by the changes, because he takes over a course. Let's say he failed in a beginning science, and he takes this new course and finds that nothing is familiar. Eighty percent of the material is new. Now that may not be a good answer.

Mr. WHITE of Idaho. That does not quite answer. What I am trying to answer in my own mind is this: When we were talking about this at the time of the 1963 hearings and then last year, we talked about the lack of skills needed for the basic research that we are envisioning here, and what I am asking you is at your specific institution have you had courses that would have trained people for this particular research effort prior to 2 years ago?

Dr. TOLLEY. Oh, yes.

Mr. WHITE of Idaho. And how many students did you have enrolled in those courses and how many did you graduate and how many were in research areas that were particularly directed in this area?

Dr. TOLLEY. I cannot give you precise figures in terms of graduates.

I did give earlier the fact that we have had since 1958 in one department, just civil engineering—and bear in mind civil engineering—

Mr. WHITE of Idaho. But what kind of degrees were conferred and where was the emphasis?

Dr. TOLLEY. Just a bachelor of science.

Mr. WHITE of Idaho. Bachelor of science in civil engineering?

Dr. TOLLEY. Yes.

Mr. WHITE of Idaho. But what special training did they have there that they would not have had in any civil engineering course in any university in the United States?

Dr. TOLLEY. Let me ask Professor Jackson to answer that.

Mr. WHITE of Idaho. Would you identify yourself for the record?

Mr. JACKSON. Daniel F. Jackson, professor of civil engineering at Syracuse University.

Since 1963 the following courses have been taught at Syracuse University. I can speak of this date because this is when I joined the staff at Syracuse University.

A course entitled "The Microbiology of Water and Waste Water," which is an entirely new approach to the studies of bacteria, algae, viruses, protozoan fungi, which are the micro-organisms that are important in water and waste water.

A course called stream sanitation, which has to do with the ecology and interaction of pollutants on a flowing environment.

A course entitled "The Limnobiology," which up to that time had not been taught, which is a course that integrates the physical, chemical, biological, and geological aspects of the environment that we have in both lakes and in water.

A course in industrial wastes, which has to do with specifically the wastes of industry and the effect that they have on the aquatic environment.

Two courses in the chemistry of water, an elementary course and an advanced course.

A new course entitled "Water Resources," which is required of all seniors, and a course that is called "Methods for the Evaluation of Water and Waste Water," which is a laboratory course.

These are courses that have been designed in the department of civil engineering.

Mr. WHITE of Idaho. If I may direct a question to you, you indicated that the next to the last course is a required course. Are the others required?

Mr. JACKSON. No.

Mr. WHITE of Idaho. The question I really want to get to is how many students—

Mr. JACKSON. Yes; I was going to get to that.

Mr. WHITE of Idaho. Would take this course and how many of them would look toward the more interesting courses in nuclear physics and so forth that are today the main interest of young people.

Mr. JACKSON. I cannot give you the exact figures.

Mr. WHITE of Idaho. Roughly.

Mr. JACKSON. I can give you in the neighborhood of what we have of the number of students. But I spoke of the last two courses being required courses. They are courses that are required of all civil engineering students, whether they are going into structures, whether they are going into hydraulics. It is a senior requirement, the same as we have of fluid mechanics or any others. So in this neighborhood we have between 15 and 18, which is the total number of students that we have in the senior class.

The other courses that I have mentioned are graduate courses. The number of students that we have had, and it varies from semester to semester, as I am sure you can appreciate, is an average enrollment somewhere between 8 and 12 students each semester in such courses.

Mr. WHITE of Idaho. I certainly want to compliment you on offering these courses, but I still think the point is made that there are not a great number of people in the United States that have completed these courses.

Dr. TOLLEY. That is right.

Mr. WHITE of Idaho. That are ready to move into research areas today, to form the nucleus research centers, and this is the problem we have.

Dr. TOLLEY. We agree.

Mr. WHITE of Idaho. And I think you are serving a most wonderful purpose in offering these courses and that we are going to need each and every course and those that you can talk into registering for these courses either as graduates or as undergraduates.

This again is the problem of proliferation of research centers and how many people are you going to have that have the capability at every university and in every area of the United States, to divide what few people we have into such a large area in the United States today.

Mr. JACKSON. I think the chancellor has an excellent statistic on that need.

Dr. TOLLEY. There are 836 positions now open in the State Department of Public Health, the New York State Department of Public Health, for professional engineers trained in the field of sanitary engineering. This shows how many jobs there are going begging.

Mr. WHITE of Idaho. I think that more or less clarifies the entire issue that there is a need, and this is one of the things that I had in mind when we were talking about setting up research centers at universities to make available training in a graduate area for these people so they would be available.

I would like to make a general observation, if you will permit. Lots of times people criticize the Congress of the United States for moving into areas that should have local control, local regulation. But I think as we further discuss what we have been talking about here today, that oftentimes there is a lack at the local level, and I know in my own area, where the waters are probably as crystal clear as in any part of the United States, that people are dumping raw sewage into them as fast as they can, and that local entities of government take no interest in it, and that is why it ends up in the Congress of the United States.

The CHAIRMAN. My colleague would not go out on a limb to suggest that we have a Federal study aimed at that operation?

Mr. WHITE of Idaho. In pollution?

The CHAIRMAN. That kind of pollution.

Mr. WHITE of Idaho. I think it should still be solved at the local level if that is possible.

Mr. ROGERS. Will the gentleman yield?

Mr. WHITE of Idaho. I will be glad to yield to the chairman.

Mr. ROGERS. The gentleman means it is because of the lack of control or attention to this problem that the people come to the Federal Government for relief.

Mr. WHITE of Idaho. That is right.

I want to thank you for your previous presentation. I have no further questions.

Mr. ROGERS. Mr. Roncalio?

Mr. RONCALIO. I have a short statement of each witness. I appreciate very much the professional competence and dedication each of you have given to your testimony. I wish the public service was as much an exact science as is yours.

Dr. Fey is the president of the University of Wyoming and we regret very much he will no longer be with us after a few months. He returns to Vermont. I presume your statement is his and you speak for him this afternoon.

Dr. MORGAN. I hope so.

Mr. RONCALIO. I will be happy to let the record show that his institution and his voice is added to yours.

Dr. MORGAN. I did confer with him before coming, Mr. Roncalio.

Mr. RONCALIO. Fine.

Dr. Tolley, do you know of any cooperation of your institution with any institution in Ontario or in Quebec that would bring international advantages to this problem, particularly on boundary water quality control in the Great Lakes?

Mr. JACKSON. Would you state that again, please, sir?

Mr. RONCALIO. Do you know of any cooperation with any of the colleges or universities of Ontario or of Quebec Provinces that would bring an international cooperation to solving the problems of boundary water, quality control of the Great Lakes?

Mr. JACKSON. At the current moment, I know that we have in the department of geology a mutual program with the University of Toronto in relation to the study of Lake Ontario. Dr. Cramer is working on the geochemistry aspect of Lake Ontario, and since we do not have a research vessel, the *Port Dolphin*, which is the research vessel of the University of Toronto, has been most kind in giving a certain number of days so that Dr. Cramer can work on the Great Lakes, and we would certainly welcome the opportunity to work with the University of Toronto for studying Lake Ontario. But at the present time there is no mechanism that we have in order to do so, except this informal agreement, as I said, between the department of geology and the University of Toronto.

Mr. RONCALIO. Thank you very much, Mr. Chairman.

Mr. ROGERS. Thank you very much, Dr. Morgan and Dr. Tolley.

Dr. TOLLEY. Thank you very much.

Mr. ROGERS. The Chair has a letter from Cornell University under date of February 10, over the signature of James A. Perkins of Cornell University, and a letter from the State University of New York at Binghamton dated February 7, signed by Bruce Dearing, president.

They will be inserted in the record at this time, without objection. The letters, as I understand it, are in support of this bill.

(The letters referred to follow:)

CORNELL UNIVERSITY,
Ithaca, N.Y., February 10, 1966.

Hon. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: You will recall that Cornell University was selected by the Department of the Interior to be one of the initial 14 land-grant universities to be provided with annual basic allotment funds authorized by the Water Resources Research Act of 1964 (Public Law 88-379).

We are now completing our first full year of operation under this act and it is my pleasant task to inform you that the aims of the legislation as envisioned by you and the members of your committee are being achieved by Cornell University. In addition, Director Leonard Dworsky of our center assures me that, in his opinion, this is the general situation throughout the country.

My purpose in writing at this time is to indicate our support for S. 22 as passed by the Senate, amending title II of the Water Resources Research Act of 1964, and the several companion bills in the House (H.R. 3606; H.R. 5930; H.R. 6282; H.R. 8916).

When S. 2, on which the Water Resources Research Act was based, was being debated on the floor of the House, Congressman Rogers indicated that the Committee "* * * realized the limited amount of money available would make it necessary that they (the land-grant institutions) have some hardware * * * and a program in operation * * *." The committee has also viewed the program under the act as one involving cooperation between the universities and the Federal Government.

For the fiscal year 1967, Cornell University will receive \$87,500 under its annual allotment from the Department of the Interior and will expend of its own funds approximately \$70,000 for the activities carried out by the water resources center.

While Cornell University is engaged in a strong program of water resources research, we are fully aware of the substantial competence elsewhere which could make significant contributions to the management of water resources. The annual allotment cannot be used to support research much beyond the land-grant university. Otherwise the fear earlier stated by Congressman Rogers about the ineffectiveness of fragmented programs might become real.

At the same time, Cornell University is cooperating fully with at least six other institutions in New York State. We provide information about matching grants under title I. We have also arranged for the receipt, technical review, processing, and financial management of several matching grants proposed by other institutions. The number of matching grant proposals that may be submitted by other institutions for the limited funds is unlimited. This may become a matter of some concern.

We believe that the provisions of title II as contained in S. 22 provide improved procedures for financing water resources research as well as providing for wider participation on the part of many qualified public and private organizations.

The continuing drought in the Northeast accentuates the need to concentrate on the development of new knowledge to help improve the management of our water resources. In an earlier letter to you on S. 2, I noted that "the acquisition of knowledge is a prudent investment and both Houses of the Congress have acted wisely to encourage research in water resources to assure the conservation of this vital substance." This prudent investment is becoming more important and S. 22 provides a marked advance in our ability to undertake water resources research.

Respectfully,

JAMES A. PERKINS, *President.*

STATE UNIVERSITY OF NEW YORK AT BINGHAMTON,
Binghamton, N.Y., February 7, 1966.

Hon. WAYNE ASPINALL,
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR REPRESENTATIVE ASPINALL: I am writing to urge you to give favorable consideration to title II of the Water Resources Act which has passed the Senate (S. 22) and will be considered by your committee later this month as H.R. 3606 and related parts in Public Law 88-379.

Favorable action on this piece of legislation will allow agencies all over the country to get on with the much belated program of research and study on the water resources problem. It is significant to note that we are currently well into the International Hydrological Decade—a program the origin of which the United States sponsored—without any significant special funding having been arranged to support these activities. I urge you to support the original form of title II of the Water Resources Act.

Yours sincerely,

BRUCE DEARING, *President.*

(The following letters and statements of Dr. Walker and F. P. Thieme are included at this point pursuant to permission later granted:)

THE PENNSYLVANIA STATE UNIVERSITY,
University Park, Pa., February 17, 1966.

HON. WAYNE ASPINALL,
Committee on Interior and Insular Affairs,
House Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: I am sorry that weather and schedules prevented me from meeting with your committee to discuss Senate bill S. 22 in which I have an interest as a citizen concerned with a major problem facing this country. I am taking the liberty of sending you a copy of the remarks I would have made had I been able to appear.

Sincerely yours,

ERIC A. WALKER, *President.*

REMARKS ON SENATE BILL 22

Mr. Chairman, it's very good of you to allow me a few moments to talk to this committee. Let me assure you that I am very anxious to say something about S. 22 and the idea behind it, because I think it is a start on some badly needed action, but it is only a start. It isn't a matter of concern to me whether this work is done by a specific set of institutions or by a wide range of institutions. The problem is so big that we need all the help we can get.

This problem is not one which is confined to water resources. It's a problem which impinges on many of the things this Nation is trying to do, and some of them not very successfully. A part of our difficulty seems to lie in the rather narrow definition that we tend to give to research. The National Science Foundation, with whose program I am well acquainted, is devoted almost entirely to research. Some of it we call basic and some of it we call applied. There are other organizations in the Government which support research, but the product of research is new knowledge, and new knowledge, valuable as it is to those who wish to know how things work, is of very little help to humanity in general until we put it to work.

Now usually we count on industry to take the fruits of research and do the development and whatever else must be done to produce a machine, device, or system which the public wants and which the public will buy. And because usually the public will buy it at a price that will cover expenses and allow the company to make a profit, the whole system fits into our way of life.

But, let me point out there are many things which we need which no industry can manufacture and sell at a profit, and one of these things is plenty of good water. Water is usually treated by municipalities and distributed by them for the convenience of the citizens. And, although it might be distributed by a private corporation, they are subject to regulation. Regardless of what the restraints are, neither the governing bodies nor the private companies are willing or can afford to take the risk in trying new experiments which might fail.

Let me point out that the Department of Defense does research and development, but in the Department of Defense we hear of R.D.T. & E., test and evaluation as well as research and development. As a matter of fact, the Department of Defense pays for the manufacture of pilot models, tests the pilot models, redesigns them, trains the people to use them, and tests the final product to see if redesign again is necessary to fill their needs. It is a well known fact that we would not get new weapons for the military if we counted on private industry to develop them to sell at a profit thus taking all of the risk.

The Atomic Energy Commission, also, continues the whole gamut from research to final use. And this is how we developed the power reactors. NASA does research and development but it doesn't abandon that research and development to private industry and ask it to make the moonshot.

The point I want to make is that if we are to get the proper development and engineering of our water resources, we've got to find ways of doing more than research. We've got to find ways of producing pilot plants, putting them to work in municipalities, testing them, redesigning them, and someone has to accept the risk of failure.

We at the Pennsylvania State University have had experience in this, and have built and operated pilot plants for the water retrieval which we have found

necessary to finance ourselves. We would much rather have devoted that money to other purposes, and obviously would have done so if we had been able to get the Federal Government to assist us with this kind of work. But not many universities have the incentive to try such things.

As I have pointed out, no town council or city government is going to risk the installation of a sewage plant which has only a 50-50 chance of working. The voters would not reelect them. Yet, there is a possibility that if the new design did work, the country would take a major step forward in water retrieval.

No matter where we get it or who does it, it is going to be in the interests of this country to spend more money on this kind of work. I think it will have to be done by the mission-oriented agencies of the Federal Government.

Now this proposed bill, S. 22, provides funds, as I understand it, which can be used by institutions or municipalities for demonstration tests or for experimental plants having to do with water purification. In this way we can put our basic research information on water to the use of communities.

UNIVERSITY OF WASHINGTON,
Seattle, Wash., February 16, 1966.

HON. THOMAS S. FOLEY,
*House of Representatives,
Washington, D.C.*

DEAR CONGRESSMAN FOLEY: I appreciate the opportunity to submit to you for insertion in the hearing record the following statement on behalf of the University of Washington with respect to legislation designed to restore title II to the Water Resources Research Act of 1964.

The University of Washington is pleased to add its support to legislation designed to increase the support of water resources research. Under the Water Resources Research Act of 1964, we joined with our distinguished sister institution, Washington State University, in the establishment at Pullman, Wash., of the State of Washington Water Research Center. In this enterprise, under the directorship of Prof. Roy Tinney, of Washington State University, and a joint scientific committee comprising an equal number of scholars from both universities, our institutions have joined in a multidisciplinary study of critical water problems facing the State, region, and Nation. We have also made every effort to join with scholars, research experts, and Government analysts elsewhere in the region and the Nation so that our research will have the broadest base possible.

We believe that Government support of water resources research must be guided by certain key principles and goals:

- (1) Wise use of the limited number of trained and experienced research personnel to do the special kind of multidisciplinary research required and take the leadership in its the design and execution. This should be without regard to their institutional, public or private, academic or nonacademic, affiliations.

- (2) A major increase in the number of such trained personnel which means an important academic commitment to multidisciplinary graduate work on resources with a substantial increase in the social sciences.

- (3) Flexibility in geographic, institutional, and project organization of research. The evolution of regional centers or regional combinations of State centers should be encouraged as in many cases it represents a wiser use of the scarce resources than a rigid State-by-State system.

We believe that title II will strengthen the water research program quantitatively and qualitatively by permitting the participation of more research people in existing center organizations and at other institutions working in the water research program under the act. The inclusion of other academic institutions and nonuniversity research agencies strengthens flexibility and assures the widest possible choice of qualified research personnel and institutions.

The matching funds available under title I are on a dollar-for-dollar basis. Title II funds should not be so limited. For many types of research purposes the latter arrangement is essential to provide flexibility in negotiating financial arrangements to suit particular needs. Funds available under title I are simply too limited to do the job. The provisions of title II should permit selective Federal support of water research at a pace more nearly suited to the need.

We support the passage of this additional legislation. At the same time, we urge that it be administered in a flexible way so that regional combinations, as-

sociations and research strategies may merge to assure optimum use and development of the rare and critically needed multidisciplinary research skills which this field so thoroughly needs.

Thank you for the opportunity to make this statement.

Very sincerely,

F. P. THIEME, *Vice President.*

Mr. ROGERS. The Chair will now recognize Dr. Roland R. Renne, Director of the Office of Water Resources Research.

Dr. Renne, you may come forward.

I believe Dr. Bates was going to come with you, too, and such other assistants as you may require.

STATEMENT OF DR. ROLAND R. RENNE, DIRECTOR, OFFICE OF WATER RESOURCES RESEARCH; ACCOMPANIED BY E. D. EATON, ASSOCIATE DIRECTOR, OFFICE OF WATER RESOURCES RESEARCH; AND THOMAS F. BATES, SCIENCE ADVISER TO THE SECRETARY, DEPARTMENT OF THE INTERIOR

Dr. RENNE. Mr. Chairman, I have our Associate Director, Mr. E. D. Eaton, with me.

Mr. Chairman, I have a statement which I think has been distributed to the members. I would like to submit that for the record, if that is favorable with you.

Mr. ROGERS. Dr. Renne, your statement will be included in the record at this point as if read in full, unless there is an objection.

The CHAIRMAN. (Mr. Aspinall). Dr. Renne, I want to know whether or not you will offer any new material as you make your presentation that is other than that which is in your statement.

Dr. RENNE. Yes, I will.

The CHAIRMAN. Will you tell us when you come to the place where you are offering some new material that is not found in your statement?

Dr. RENNE. Very good, Mr. Aspinall.

Mr. ROGERS. Without objection, your statement will be included as heretofore specified, and I would presume that you would want the attachments that are included with your statement to be included as a part of your statement.

Without objection, it is so ordered, Doctor, and you may proceed. (The statement referred to follows:)

STATEMENT BY ROLAND R. RENNE, DIRECTOR, OFFICE OF WATER RESOURCES RESEARCH, DEPARTMENT OF THE INTERIOR

Mr. Chairman, in keeping with the legislative report of the Department of the Interior, my testimony is in favor of S. 22 and the companion House bills (H.R. 3606, H.R. 5930, H.R. 6282, and H.R. 8916).

These bills complement the provisions of the Water Resources Research Act of 1964 (Public Law 88-379). They provide for utilizing the full range of scientific and engineering research competence in urgently needed water resources research which is the purpose of the act. At the present time such full-range competence is not being utilized.

I would like to report briefly on the progress that has been made thus far under title I of the Water Resources Research Act of 1964, and in doing so indicate some shortcomings and inadequacies in our program that could be reduced or removed with implementation of title II of the act through enactment of the bills under consideration.

I believe each of you have received a copy of our first annual report summarizing the activities and accomplishments of the 51 water resources research institutes which received support under the act during fiscal year 1965. This report covers only a very short period of operations, however, since 37 of the 51 institutes were not funded until May 1965 and had less than 2 months of operation in fiscal year 1965, and the remaining 14, funded in January, had less than a half year of operation.

During fiscal year 1966, marked progress has been made. The research programs of the 51 institutes, financed largely with the \$87,500 annual allotment to each institute, have been strengthened and focused more sharply on areas of research identified as of highest priority. It is significant that four-fifths of the 384 allotment projects currently underway fall within the 5 areas of research identified for highest priority in the 1966 report of the Federal Council for Science and Technology, "A 10-Year Program for Federal Water Resources Research." These five areas are: (1) Research for perfecting water resources planning, (2) research on economic, legal, social, and related aspects of water resources, (3) ground water research, (4) water quality research, and (5) research on water-plant-soil relationships.

Thus far during fiscal year 1966, there has been a fivefold increase in the number of matching grant requests submitted from institutes and a marked improvement in quality. After funding 71 of the 139 proposed projects with the \$1½ million matching grant funds available in fiscal year 1966, and rejecting 21 projects totaling \$329,000 because they duplicated other research (11 projects) or were not eligible or did not deal with a significant water problem or were otherwise not considered adequately meritorious (10 projects), a backlog of 60 meritorious unfunded projects totaling \$2,086,000 remains. This encouraging quantity and quality reflects both growing interest and competence among the State and land-grant universities.

Twenty-six noninstitute universities are now participating directly in the research programs of the 51 institutes, making a total of 77 universities with 1 or more projects under the allotment and/or matching grants program authorized in title I.

Finally, and of great importance, coordinating efforts to eliminate wasteful and unnecessary duplication of effort in water resources research have been markedly strengthened in the past year. In keeping with provisions of section 300 of the act assigning important water research coordinating responsibilities to the Secretary of the Interior to assure that programs authorized in Public Law 88-379 supplement and not duplicate established research programs, we have published two water resources research catalogs covering ongoing water research projects federally and nonfederally supported. A comprehensive set of key words in the water research field for effective information indexing and retrieval has been prepared and will be published soon. Comprehensive bibliographies in selected research areas and comprehensive state-of-the-art studies by competent scientists are also proving helpful in eliminating wasteful and undesirable duplication of effort.

A very significant development is the establishment on February 1, 1966, by the Secretary of the Interior, of the Water Resources Scientific Information Center to utilize modern information retrieval techniques for the exchange of water research information within the Department and improve communication in water research among the Department's bureaus and offices. We have been in given responsibility for managing this center and are pursuing this scientific information program vigorously. Obviously, the necessity for avoiding undesirable duplication of water resources research by improving coordination, communication, and dissemination of information will be even more important with the marshaling of the Nation's full research potential through implementation of title II.

Although we feel we are off to a good start and have some very excellent water research projects underway, we are not able to carry out the full program contemplated by the act without title II which, as you all know, is not yet operative. We have been operating only title I of the act and can support only those meritorious projects submitted to us by the 51 State water resources research institutes.

We have not and are not now tapping anywhere near the total research and training competence of our universities. There are very strong and competent universities not in our program and little or no prospect that they will be under title I. For example, there are eight major universities in Illinois, and effective

coordination and participation of all these universities in water research programs through the institute located at the University of Illinois at Urbana would result in excessive fragmentation of the institute's allotment (sec. 100) funds. Also matching fund requests from this many public universities within the State would create direct competition with the institute university for the limited funds available under section 101. In the case of California, there are nine universities in the University of California system, and parceling out the limited allotment funds to the nine would diffuse the funds excessively, reducing their effectiveness and increasing administrative and accounting costs. Under this situation, direct participation in the program through the institute university as required by title I of other California universities such as Stanford, University of Southern California, and California Institute of Technology is not likely to occur.

These two examples are sufficient to demonstrate the point that we will not tap the total water research and training competence of our universities with title I alone. Several other examples could be mentioned such as Harvard University and Massachusetts Institute of Technology, submitting proposals through the University of Massachusetts, Columbia University, Syracuse University, University of Buffalo, and other universities in New York State through the Cornell University Center, or Duke through the North Carolina State University Center at Raleigh. The fact that only 26 noncenter universities are currently participating in research projects, of which only 3 are private (Princeton, Clark, and Ashland), indicates that virtually all of the noncenter institutions and the private universities are excluded.

Not only are we depriving ourselves of the research competence of many of our excellent universities, but also we are not getting participation in the program of many nonacademic, nonprofit organizations such as the Research Institute of the Illinois Institute of Technology; Stanford Research Institute; Mellon Institute; Batelle Memorial Institute; Spindletop Research Center at Lexington, Ky.; Drexel Institute of Technology; Houston Research Institute, and others. These nonprofit research groups through years of experience have developed considerable competence in certain specialized areas in the broad research field of water resources. Their special staff competencies are not now being used nor are they likely to be drawn into title I activities.

We are also depriving ourselves of the research competence of organizations such as Melpar, Inc.; North Star Research and Development Corp.; Franklin Institute Research Laboratories; Technology Planning Center, Inc.; Cyrus William Rice & Co.; Itek Corp.; Midwest Research Institute; Hydronautics, Inc., and Geoscience Associates, Inc., to mention but a few, that have acquired a high degree of competence in the development of instrumentation, mathematical modeling, and systems analysis. It is not logical to expect the typical university campus to be effective in the research and development work required for the production of prototype instrumentation for the measurement of complex hydrologic parameters. Such work is the speciality of a few organizations with years of experience. In the relatively new field of systems analysis, several nonuniversity groups have become eminent by virtue of contract work performed for Federal and State agencies and industries. This experience, not available on campus, could well be applied to the problems of basin water development and management plans. Finally, some State agency and individual research could be funded under title II.

We believe the act and the rules and regulations pursuant to the act and the steps already taken by our Department and Office which were mentioned earlier, provide sufficient safeguards against duplication of effort so the implementation of title II will result in effective programs supplemental to title I and other research of great importance in solving some of our major water problems.

One further consideration should be mentioned regarding implementation of title II. Under title I, all matching grant funds under section 101 must be matched dollar for dollar with non-Federal funds by the institutes. There is a great deal of variation among the different fields of research in their ability to secure matching funds, and matching fund availability rather than strictly merit considerations frequently determines the projects submitted under section 101. Title II provides more adaptability of fund availability by providing for outright grants, and contracts, as well as dollar-for-dollar matching.

Although no funds have been available under title II, there has been a great deal of interest in this part of the act. In addition to many visits, letters, and telephone calls weekly concerning title II, 67 proposals or prospectuses have been

submitted by noncenter universities and nonacademic organizations for consideration if title II funds become available. These proposals total more than \$4¼ million in requests. Of these 67 proposals, 41 suggest areas for research and describe approaches which are currently not being explored by our title I projects. It would appear, therefore, that if title II funds were available, there would not only be strong competition for research financing by many universities and research organizations not now participating in the program, but also the resulting research combined with that now being carried on with title I funds would provide a more adequate and beneficial overall research effort to solve our growing water problems.

OFFICE OF WATER RESOURCES RESEARCH ANNUAL ALLOTMENT PROGRAM, FISCAL YEAR 1966

Approved allotments to State institutes

The annual allotment program for fiscal year 1966 authorizes \$87,500 for each of the 51 State institutes. Each State institute has submitted an approved budget in like amount covering the fiscal year 1966 institute allotment for water resources research and training. Total obligational authority for this budget activity in fiscal year 1966 is \$4,463,000.

MATCHING FUND GRANT PROGRAM, FISCAL YEAR 1966

Approved grants to State institutes

State (1)	Amount of grants (2)	Amount budgeted by institutes for fiscal year 1966 (3)
Alabama.....	\$27,700	\$18,264
Alaska.....	17,685	16,750
Arizona.....	45,750	45,750
California.....	153,608	62,251
Colorado.....	75,694	24,248
Delaware.....	29,600	4,900
Georgia.....	101,434	34,515
Illinois.....	59,200	16,934
Iowa.....	5,000	5,000
Kansas.....	21,685	14,399
Louisiana.....	13,567	9,000
Maryland.....	29,627	29,627
Minnesota.....	78,140	31,000
Missouri.....	80,935	61,118
Montana.....	42,920	34,958
Nevada.....	42,600	33,000
New Mexico.....	33,467	22,358
New York.....	81,350	22,700
North Dakota.....	14,314	5,460
Ohio.....	81,860	28,460
Oklahoma.....	4,100	4,100
Oregon.....	39,867	18,850
Pennsylvania.....	20,436	11,668
South Carolina.....	39,500	13,500
Texas.....	29,877	9,772
Utah.....	124,150	124,150
Washington.....	88,511	54,011
Wisconsin.....	117,050	38,980
Total.....	1,499,627	795,723
Fiscal year 1966 obligational authority.....	1,500,000	-----

NOTES

The equal amounts of non-Federal funds that are included in matching grant project budgets are not shown above.

The time period during which a matching grant agreement is effective extends over the entire time during which project activity is scheduled. Thus, the beginning and ending dates specified in a matching grant agreement do not necessarily coincide with the beginning (July 1) or ending (June 30) dates of a standard fiscal year.

OWRR PROGRAM ADMINISTRATION ¹*Fiscal year 1966 estimated expenditures by object classification*

Personnel compensation and benefits ² -----	\$285, 000
Travel and transportation-----	42, 000
Rent, communications, and utilities-----	9, 000
Printing and reproduction-----	29, 000
Other services-----	21, 000
Services of other agencies-----	27, 000
Supplies and materials-----	5, 000
Equipment-----	15, 000
Total -----	433, 000

¹ Expenses of the Office of Water Resources Research include costs of developing the program, reviewing and analyzing research project proposals, coordinating research activities, preparing state-of-the-art studies and catalogs and disseminating technical water research information, and advising the research centers relative to research needs, as well as for administrative functions.

² Includes \$6,000 proposed for separate transmittal for pay increase supplemental.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966*

Proposal No.	FCST ¹ categories	Title and principal investigator
ALABAMA		
A-001-ALA-----	5F-----	Evaluation of earthy materials for use in decontamination of water. Dixon.
A-002-ALA-----	5B-----	Biological and chemical oxidation of selected organic pesticides. Leigh.
A-003-ALA-----	2E-----	A reconsideration of flow of liquids in open channels. Shib.
A-004-ALA-----	5A-----	Water resources nematology. Cairns.
A-005-ALA-----	2A-----	Correlation between soil surface characteristics and rainfall-runoff-antecedent moisture relationships on agricultural watersheds on coastal plain soils. Hendrick.
A-006-ALA-----	5A-----	Studies on the interactions of bacteria and aquatic nematodes. Wilt
ALASKA		
A-002-ALAS-----	5A-----	Dissolved organics in interior Alaska ground water. Birkholz.
A-004-ALAS-----	2K-----	Inherent and maximum microbiological activity in Smith Lake. Burton.
A-005-ALAS-----	8A-----	Analysis of salmon capabilities in steep fish ladders. Behlke.
A-006-ALAS-----	6B-----	Evaluation of water resource research needs in Alaska. Behlke.
A-007-ALAS-----	5C-----	Kinetics of vitamin-limited microbiological activity. Button.
A-008-ALAS-----	2J-----	Interstitial waters of glacial-marine sediment. Hoskins.
A-009-ALAS-----	2C-----	Study of methods of elimination of ice jamming on northern streams. Cook.
A-010-ALAS-----	5C-----	Effects of water quality and quantity on the fauna of nonglacial Alaskan rivers. Morrow.
A-011-ALAS-----	2I-----	The distribution and succession of aquatic vascular plant communities in relation to physical-chemical characteristics of various lakes and ponds of the Tanana Valley, Alaska. Harnes.
A-012-ALAS-----	2C-----	A study of the freezing cycle in an Alaskan stream. Benson.
ARIZONA		
A-001-ARIZ-----	3B-----	Development of surface storage facilities for paved catchment runoff water. Fogel.
A-002-ARIZ-----	4B-----	Artificial ground water recharge of paved catchment runoff water. Wilson.
A-003-ARIZ-----	3B-----	Selection and testing of materials for surfacing watershed areas. Fogel.
A-004-ARIZ-----	5F-----	Development of methods for making potable water from paved catchment runoff water. Fogel.
ARKANSAS		
A-001-ARK-----	6G-----	Environmental changes produced by cold-water outlets from three Arkansas reservoirs. Strawn.
A-002-ARK-----	3F-----	Development of automated subirrigation system. Bryan.
A-003-ARK-----	2E-----	Quantitative analysis of streamflow rate extremes. Heiple.
A-004-ARK-----	5C-----	Interaction of inorganic and organic fertilizer materials with pesticides as related to water quality in soils. Brown.
A-005-ARK-----	5B-----	Virus movement in groundwater systems. Drewry.
A-006-ARK-----	6B-----	Water resources research needs in Arkansas. Sparks.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
CALIFORNIA		
A-002-CAL	6D	The impact of water export on the area of origin: A case study in the Owens and Mono Basins. Parsons.
A-003-CAL	4B	Systems analysis for ground water basin management. Todd.
A-004-CAL	5G	The management of surface water hydrologic system for water quality control. Orlob.
A-005-CAL	3C	The acceptability of mineral taste in domestic water. Knutson.
A-013-CAL	5C	The persistence of residues and the fate of herbicides in rice fields and rice field effluents. Seaman.
A-014-CAL	6F	The municipality as a water policy determining entity. Crouch.
A-015-CAL	2F	Problems in water transport through porous media. Perrine.
A-016-CAL	2B	Relationship between the anomalies of the Pacific Ocean temperatures and those of California rainfall. Bjerknes.
A-017-CAL	5D	Reducing the pollutional burden of food plant wastewaters. Hart.
COLORADO		
A-001-COLO	1A	Changes in the physical and biological characteristics of ground water reservoirs and adjacent surface waters. Morrison.
A-002-COLO	4A	Surface water management. Simons.
A-003-COLO	6B	Water storage management. Yevjevich.
A-004-COLO	2B	Atmospheric water. Riehl.
A-005-COLO	6B	The economics of administration of water resources. Barkley.
CONNECTICUT		
A-001-CONN	5E	Individual waste disposal systems. Wheeler.
A-002-CONN	2D	Diffusion through multiperforate septa. Lee.
A-003-CONN	5C	Response of fish to controlled pollution. Whitworth.
A-004-CONN	2F	Relation of bedrock fracture systems to underground water supplies in the Stafford Springs, South Coventry, Spring Hill, and Westford quadrangles. Aitken.
A-005-CONN	2F	Rate and direction of ground water circulation in close spaced bedrock and gravel wells under the influence of nonsynchronous pumping time and rates. Frankel.
A-006-CONN	6B	The role of regional planning in the public management of water resources: The case of the Farmington River Basin. Kasperson.
A-007-CONN	2K	Correlation of trace elements in ground waters and aquifers within the Connecticut River Basin-Liese.
A-008-CONN	2B	Analysis of quasi-periodic weather data. Posey.
A-009-CONN	4D	Reverse filter corrosion protection. Poscy.
A-010-CONN	1B	The determination of the engineering thermophysical properties of solutions containing dissolved solids. Fisher.
A-011-CONN	5G	Reduction of river heat pollution by turbulence stimulation. Scottron.
DELAWARE		
A-001-DEL	5D	Increased gas transfer in biological reactors of interest to waste water reclamation. Zandi.
A-002-DEL	3F	Increasing water use efficiency by altering plant growth, the plant microclimate, and the method of irrigation. Fieldhouse.
A-003-DEL	6E	Investigation of the economic, governmental, and other social aspects of water resources development in Delaware. Overman.
A-004-DEL	2F	The ground water flow system in the Delmarva Peninsula. DeWiest.
A-005-DEL	5F	Mass transfer rates in structured media with emphasis on systems of interest in water conservation and reuse. Metzner.
FLORIDA		
A-001-FLA	6E	A comprehensive study of Florida water law. Maloney.
A-002-FLA	5C	Factors affecting accelerated eutrophication of Florida lakes. Putnam.
A-003-FLA	3F	Irrigation efficiency. Myers.
A-004-FLA	2F	Rate of solution of limestone in the karst terrane of Florida. Brooks.
GEORGIA		
A-001-GA	2H	The monitoring of integrated light levels and average temperatures in lakes. Birkebæk.
A-002-GA	1B	Adsorption of ions in trace concentrations on soil and silt particles. Eichholz.
A-003-GA	5C	Method for predicting the effects of pollutants on the dynamic oxygen balance of a water. Gates.
A-004-GA	2A	Tracing storm and base flow to variable source areas on forested headwaters. Hewlett.
A-005-GA	2K	Biological, chemical, and physical factors controlling the concentration of manganese in the hypolimnion of impoundments. Ingols.
A-006-GA	2F	The artesian system in Georgia: stratigraphy and hydrology of the Ocala. Riehl.

See footnote at end of table.

*List of research projects by States under annual allotment program (see. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
GEORGIA—con.		
A-007-GA-----	2K-----	Determination of the content and behavior of specific trace cations in ground and surface waters, and their adjustment to passage in or on subsurface geologic formations of contrasting chemical and mineralogic compositions. Salotti.
A-008-GA-----	2K-----	The extraction of potassium from fresh and saline waters by clay minerals. Weavers.
A-009-GA-----	6A-----	Efficient design and utilization of rainfall networks. Snyder.
A-010-GA-----	6A-----	Survey of the nature and magnitude of the water research needs of the textile industry of Georgia. Hyden.
HAWAII		
A-001-HI-----	2F-----	Pollution effects on ground water recharge in Hawaii. Lau.
A-009-HI-----	2F-----	Feasibility of seismic exploration for ground water. Cox.
A-010-HI-----	2D-----	Pilot evapotranspiration investigation. Ekern.
A-011-HI-----	2A-----	Hydrologic conversion of the Ewa Beach test well. Cox.
IDAHO		
A-003-IDA-----	2J-----	Effects of stream sedimentary deposits on the distribution and metabolic activity of the bottom fauna in Coeur d'Alene Lake, Idaho. Ferguson.
A-008-IDA-----	2K-----	Study of solid-liquid phase precipitation measuring device. McKean.
A-009-IDA-----	2F-----	Canal seepage and ground water. Peebles.
A-010-IDA-----	6E-----	A critical study of the Idaho Code and laws together with various agencies and their functions in the field of water resources. Walenta.
A-011-IDA-----	2F-----	Detailed ground water investigation of the Moscow Basin, Idaho. Jones.
A-012-IDA-----	2A-----	A microclimatic profile from the Snake River to the Clearwater Mountains. Day.
A-013-IDA-----	5A-----	A lethal index for classifying chemicals which affect water quality for aquatic life. MacPhee.
A-014-IDA-----	6G-----	Characteristics of major forest and range experiment stations in Idaho. Tisdale.
A-016-IDA-----	2A-----	Hydrology of frozen ground floods. Robertson.
A-017-IDA-----	6C-----	Economic value of water in different uses within agriculture. Folz.
ILLINOIS		
A-001-ILL-----	5G-----	Influence of turbulence on surface reaeration. Holley.
A-004-ILL-----	2K-----	Effect of organic compounds on the ion exchange adsorption of radioactive cations on clays. Ewing.
A-005-ILL-----	2K-----	Occurrence of nitrate in water wells. Larson.
A-006-ILL-----	2E-----	Microscopic determination of tractive force distribution in free-surface water conveyances. Wenzel.
A-010-ILL-----	8A-----	Basic study of jet flow patterns related to stream and reservoir behavior. Maxwell.
A-011-ILL-----	6B-----	Development of drainage assessment procedures based on physical features in Illinois. Jones.
A-012-ILL-----	2B-----	Quantitative measurements of precipitation of Lake Michigan. Chagnon.
A-013-ILL-----	2F-----	Geologic controls on ground water discharge in selected small stream basins in Illinois. Farvolden.
INDIANA		
A-001-IND-----	7A-----	Estimation of runoff from small watersheds. Delleur.
A-002-IND-----	6A-----	Statistical analysis of ground water use and replenishments. Johnson.
A-003-IND-----	2E-----	Hydraulics of flow in meandering rivers with flood plains. Toebes.
A-004-IND-----	2G-----	Characterization of the rate of water infiltration into soil. Swartzen-druber.
A-005-IND-----	5C-----	Effect of pesticide residues and other organotoxins on the quality of surface and ground water resources. Monke.
IOWA		
A-001-IA-----	6D-----	Economic factors in the establishment of water quality stream standards. Dougal.
A-002-IA-----	2I-----	Evaluation of flood damage to corn from controlled depth and frequency of flooding. Beer.
A-003-IA-----	2G-----	Moisture movement to vertical sinks in water-unsaturated soil. Kirkham.
A-004-IA-----	2E-----	Recession characteristics of Iowa streams. Howe.
A-005-IA-----	6D-----	Competitive recreational uses of selected Iowa lakes. Haugen.
A-006-IA-----	2E-----	Discharge valley form relationships of selected Iowa streams. Salisbury.
A-007-IA-----	5A-----	To collect, characterize, and study the biodegradability and the chemical oxidation of carbon-adsorbed materials from effluents from sewage plants. Sletten.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
IOWA—con.		
A-011-IA-----	2G-----	Movement of radionuclides through soil formations. Ouhman.
A-012-IA-----	2F-----	Geology of the regolith aquifers of the Nishnabotna Basin. Hussey
A-013-IA-----	1A-----	Properties of tile drainage water. Willrich.
A-014-IA-----	2A-----	Influence of geohydrology on landscape and soil formation. Ruhe
A-015-IA-----	2E-----	Laboratory investigation of flow in river bends. Rouse.
A-016-IA-----	5G-----	Reoxygenation of Iowa streams. Smith.
KANSAS		
A-001-KAN-----	5A-----	Evaluation of an index for viral pollution. Lochr.
A-002-KAN-----	2F-----	Numerical modeling of ground water flow. Weinaug.
A-003-KAN-----	2E-----	Derivation of continuous basin hydrographs by routing. Smith.
A-004-KAN-----	2G-----	Integrated soil moisture measurement using radio waves. Eagelman.
A-005-KAN-----	2D-----	Micrometeorological investigations of the energy budget as related to water loss. Bark.
A-006-KAN-----	6C-----	Financing water resource facilities. Daicoff.
A-007-KAN-----	6B-----	Value of water for irrigation in the Kansas River Valley. Pine.
A-008-KAN-----	5E-----	Pollution from animal feedlots. Larson.
A-009-KAN-----	4A-----	A study of energy dissipation devices to control erosion resultin from the discharge of flow from conduits into open channels Haynie.
KENTUCKY		
A-001-KY-----	5F-----	Economic analysis of alternative flood control measures. James.
A-002-KY-----	5C-----	A study of the persistence of pesticides in impounded waters. Lauderdale.
A-003-KY-----	2F-----	A field and laboratory study of factors controlling porosity and permeability in the Curdsville member of the Lexington limestone. MacQuown.
A-004-KY-----	2D-----	Mathematical description of transpiration of water as affected by soil, plant, and environmental factors. Ligon.
A-006-KY-----	4A-----	The economic impact of flood control reservoirs. James.
A-007-KY-----	5C-----	An ecological study of the effects of strip mining on the microbiology of streams. Weaver.
LOUISIANA		
A-001-LA-----	4A-----	Study of measures to be taken to accomplish protection of the ground water supply of the Baton Rouge area from degradation due to the intrusion of saline water into area of offtake—Legal aspects, phase 1. Hardy.
A-002-LA-----	4B-----	Fresh water storage in saline aquifers. Kimbler.
A-003-LA-----	5C-----	The effect of selected herbicides upon the growth of planktonic fresh water algae and their persistence in surface waters. Wasmer.
MAINE		
A-001-ME-----	2G-----	Basic water research on New England soils. Struchtemeyer.
A-002-ME-----	5E-----	Disposal of agricultural product wastes through the soil. Rourke.
A-003-ME-----	5D-----	Effect of nitrification of organic wastes on waters in the natural environment. Keshavan.
A-004-ME-----	5F-----	Removal of viruses from water. Sproul.
A-005-ME-----	2I-----	Pattern of precipitation dispersion as affected by different vegetative covers in Maine. Schomaker.
A-006-ME-----	5A-----	Chemical contaminants found in surface and subsurface water as related to soil and climatic conditions. Rourke.
A-007-ME-----	5A-----	The effect of salts applied to highways on the infiltration and percolation of water through the soil banding the highways. Hutchinson.
A-008-ME-----	3E-----	Water conservation in food processing. Highlands.
MARYLAND		
A-001-MD-----	6A-----	Simulation of water resources regimes. Green.
A-002-MD-----	5C-----	Effects of thermal pollution on productivity and stability of estuarine communities. Mishursky.
A-004-MD-----	5E-----	Disposal of waste from swine feeding floors to minimize or eliminate stream pollution. Green.
A-005-MD-----	5D-----	Treatment of liquid waste from food processing plants. Kramer.
A-006-MD-----	5E-----	Comparison of various forages for agricultural waste water disposal. Kresge.
A-007-MD-----	5G-----	Improvement of quality of water resources by a threefold attack: adsorption, sedimentation, and mixing. Wockenfuss.
A-008-MD-----	6D-----	An investigation of factors affecting the intensity of use or water recreation facilities. Volk.

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*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
MASSACHUSETTS		
A-001-MASS.....	6B.....	A survey and evaluation of small artificial recreational ponds in central Massachusetts. McCann.
A-002-MASS.....	6G.....	The ecology of the young fishes of the Weweantic River estuary. Cole
A-003-MASS.....	2A.....	Hydrological studies in Massachusetts. Higgins
A-004-MASS.....	5B.....	Pilot study of the occurrence and characteristics of shallow-aquifer contamination in Massachusetts. Motts.
A-005-MASS.....	3F.....	Development of methods for increasing the efficiency of water use in cranberry culture. Norton.
A-006-MASS.....	2J.....	Relation of sediment load to hydrological characteristics of Connecticut River between Northfield and Springfield, Mass. Hayes.
A-007-MASS.....	5A.....	The ecological significance of cellulolytic bacteria in Quabbin Reservoir. Reynolds.
A-008-MASS.....	5G.....	Adsorption of pesticides on earth materials. Baker.
A-009-MASS.....	5D.....	Closed systems for animal sewage treatment. Clayton.
A-010-MASS.....	5C.....	Pesticide occurrence, concentration and degradation in free water systems. Gunner.
A-011-MASS.....	5C.....	Effects of organic deposits on water quality in impoundments. Feng.
A-012-MASS.....	1B.....	Thermodynamic relationships within the system "sediment-water-air". Zajicek.
A-013-MASS.....	5C.....	The effects of climate upon the work capacity and cardiac and opercular cycles in fresh-water fish. Roberts.
A-014-MASS.....	6B.....	Conference on applied geology in Massachusetts. Farguhar.
A-015-MASS.....	3F.....	Subsurface irrigation of turf areas—Nozzle design and spacing. Whitney.
A-016-MASS.....	4A.....	Small watershed storage increase using low dams. Hendrickson.
A-017-MASS.....	2I.....	The mechanics of fluid transport in vegetation. Harris.
MICHIGAN		
A-001-MICH.....	2F.....	Ground-water recharge, dynamics of ground water flow systems and methods of delineating glacial drift aquifers. Hinze.
A-003-MICH.....	2G.....	Water movement in unsaturated soils. Kunze.
A-004-MICH.....	2I.....	Diffusion of water from the plant canopy in different atmospheres and diffusion of water in the soil-root zone. Harrington.
A-005-MICH.....	6A.....	Application of systems and optimization analysis to water quality problems in Michigan. Milstein.
A-006-MICH.....	2G.....	Seasonal movement of percolating waters to the ground water table under upland hardwood forests in southern Michigan. White.
A-007-MICH.....	5D.....	Biological recovery of waste water. Schulze.
A-008-MICH.....	5C.....	Toxic action of water soluble pollutants on fresh water fish. Fromm.
A-009-MICH.....	2B.....	Determination of intensity-duration-frequency-areal coverage of intense summertime storms. Wheaton.
A-010-MICH.....	5C.....	Biotic response to pollution reduction in a river. Lauff.
MINNESOTA		
A-001-MINN.....	4A.....	The effect of pothole drainage upon ground-water resources. Manson.
A-004-MINN.....	2G.....	Factors influencing soil freezing in forests and the importance of their effect on surface runoff. Thorud.
A-006-MINN.....	2G.....	Water adsorption and its interactions with clay and quartz. Blake.
A-007-MINN.....	5A.....	Studies on the use of planktonic desmids as indicators of the trophic status and water quality in fresh-water lakes. Brook.
A-008-MINN.....	5B.....	Water quality, organic productivity, and the distribution of organisms in Minnesota lakes. Wright.
A-009-MINN.....	2A.....	Ground-water contribution to streamflow and its relation to hydrogeologic basin characteristics and recharge rates to aquifers in Minnesota. Ackroyd.
A-010-MINN.....	2A.....	Analysis of factors affecting aquifer test results under induced streambed infiltration conditions with electric analog computers. Walton.
A-011-MINN.....	5C.....	Study of the open water distribution and abundance of net plankton as an index of eutrophication in Lake Superior. Olson.
A-013-MINN.....	2A.....	Review of analysis of precipitation and runoff data for selected watersheds in Minnesota. Bowers.
MISSISSIPPI		
A-001-MISS.....	2B.....	Precipitation probabilities in Mississippi. McWhorter.
A-002-MISS.....	6B.....	Water resource characteristics of the Town Creek watershed as an attraction for industrial users. Peden.
A-003-MISS.....	5F.....	Factors affecting the removal of iron and manganese from ground water. Robinson.
A-004-MISS.....	5F.....	Decontamination of low-level radioactive wastes with Yazoo and Zilpha clays. Middlebrooks.
A-005-MISS.....	4B.....	Ground water regulation in the coastal flatwoods of Mississippi. Miller.
A-006-MISS.....	6E.....	Law of water resources of the State of Mississippi; a multifactoral, policy-oriented study of legal prescriptions relating to water use and control. Vinson.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
MISSISSIPPI—con.		
A-007-MISS-----	5D-----	The effect of a new high temperature sewage stabilization process on enteric pathogens and viruses. Brown.
A-008-MISS-----	6B-----	Local action and acceptance of watershed development. Wilkinson.
A-009-MISS-----	6G-----	An inventory and study of beaver-impounded water in Mississippi. Arner.
MISSOURI		
A-001-MO-----	2A-----	Availability, distribution, quality, and quantity of water resources in carbonate karst terrain. Maxwell.
A-002-MO-----	6A-----	Systems approach to river basin development. Ray.
A-003-MO-----	3B-----	Determination of yields of water to be expected from different land areas in Missouri for the climatic patterns characteristic of the area. Woodruff.
MONTANA		
A-001-MONT-----	2A-----	Water resources of Montana: basic hydrologic studies of 2 selected Montana watersheds.
A-002-MONT-----	6A-----	Problems and opportunities of water resources utilization in the upper Columbia and Missouri Basins. Huffman.
A-003-MONT-----	7B-----	The application of geophysical instruments and procedures to ground water research. Groff.
A-004-MONT-----	2A-----	Water, soil and plant relations. Taber.
A-005-MONT-----	5G-----	Water quality in Montana. Taylor.
A-006-MONT-----	2F-----	Hydrogeology of the Great Falls area, Montana. Goers.
A-007-MONT-----	9A-----	Procedures for developing public interest and for the training of ground-water scientists and technicians. Groff.
NEBRASKA		
A-001-NEB-----	2D-----	Energy sources for evapotranspiration in the plains regions. Rosenberg.
A-003-NEB-----	3B-----	Engineering phases of land shaping for soil and water conservation. Wittmus.
A-004-NEB-----	6D-----	Input-output analysis of water use for Nebraska industries. Epp.
A-005-NEB-----	2I-----	Internal water status of plants. Kinbacher.
A-006-NEB-----	2E-----	Mechanics of bank seepage in natural streams during floodflows. Sarpkaya.
A-007-NEB-----	5F-----	Brackish water purification by biological fuel cell powered electro-dialysis. Scheller.
A-008-NEB-----	6E-----	A legal-economic analysis of administrative and market procedures used in the transfer of water rights. Yeutter.
NEVADA		
A-004-NEV-----	6D-----	Demand for water based recreational activities in Nevada. Wyckoff.
A-006-NEV-----	2D-----	Transpiration of plants under natural conditions. Went.
A-007-NEV-----	2J-----	Hydrologic aspects of pre-Lahontan sediments in Nevada. Mifflin.
A-008-NEV-----	5D-----	An engineering-economic model for waste water reclamation and reuse. Orcutt.
A-009-NEV-----	2F-----	Ground water flow system analysis in mountainous terrain in Nevada. Mifflin.
A-010-NEV-----	7A-----	Nevada resources data center. Maxey.
A-011-NEV-----	1A-----	Humboldt River surface water analysis. Maxey.
A-012-NEV-----	2D-----	Evapotranspiration map of the State of Nevada. Maxey.
NEW HAMPSHIRE		
A-001-NH-----	2F-----	Relationship of yield of ground water from drilled wells and types of bedrock in New Hampshire. Stewart.
A-002-NH-----	2K-----	Chemical character of ground and surface waters in relation to soil weathering processes. Hall.
A-003-NH-----	5A-----	Atomic fluorescence spectroscopy—a potential tool for trace analysis Ellis.
A-004-NH-----	2F-----	Impact of copper sulfate treatment on some of the limnological characteristics of Winnepesaukee Lake, Belknap County, N.H. Sawyer.
A-005-NH-----	5B-----	Nitrogen content of drainage water, litter and soils in the vicinity of alder and white pine sites. Petersou.
A-006-NH-----	5C-----	The survival of enteric bacteria and viruses in stabilization ponds. Slanetz.
A-007-NH-----	5A-----	Numbers and types of micro-organisms in stabilization pond effluents. Slanetz.

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*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
NEW JERSEY		
A-001-NJ-----	6E-----	Water law of New Jersey. Morreale.
A-002-NJ-----	2A-----	Drought frequency, intensity, and duration: Its correlation to stream-flow and its impact upon synthetic hydrology. Snow.
A-003-NJ-----	7C-----	An investigation of analog computer simulation of stream pollution dispersion models with chemical reactions. Davidson.
A-004-NJ-----	5D-----	Water conservation through filtration of gelatinous sludges in industrial waste treatment. Dittman.
A-005-NJ-----	2E-----	Turbulent dispersion in waterflow systems. Peskin.
A-006-NJ-----	2F-----	Petrology of aquifers of New Jersey coastal plain. Martens.
A-007-NJ-----	2F-----	Water well yields in the New Jersey highlands in relation to geologic environment. Smith.
A-008-NJ-----	2I-----	Vegetation influences on water yield on the Lebanon Forest experimental watersheds. Buell.
A-009-NJ-----	4C-----	The impact of suburban development on the water resources of New Jersey. Nathan.
A-010-NJ-----	5E-----	Industrial water and waste disposal requirements in New Jersey. Granstrom.
A-011-NJ-----	2A-----	Hydrologic analysis of the Millstone River Basin, N.J. DeWiest.
A-012-NJ-----	5A-----	Evaluation of phenol water quality. Faust.
A-013-NJ-----	6B-----	Preliminary investigation of the perception of flood hazard in the Delaware Valley. Beyer.
NEW MEXICO		
A-001-N MEX-----	2A-----	Synthetic hydrology. Viessman.
A-002-N MEX-----	5A-----	Gas chromatographic evaluation of bacterial stream pollution. Garner.
A-003-N MEX-----	1A-----	The effect of water quality and environmental factors on the distribution of fresh water vertebrates in the Rio Grande River. Whitford.
A-004-N MEX-----	2G-----	The effects of soil properties on the retention, percolation, and runoff of precipitation. Anderson.
A-005-N MEX-----	2K-----	Plant composition and soil properties as affected by irrigation water quality. Dregne.
A-006-N MEX-----	3F-----	The effect of irrigation method, and moisture and fertility levels upon maximizing water use efficiency and quality cotton fiber production. Williams.
A-007-N MEX-----	7C-----	Inventory of irrigation areas and determination of consumptive uses by areas. Henderson.
A-008-N MEX-----	2F-----	Geohydrology of the lower Rio Grande Valley and adjacent intermontane areas of New Mexico. King.
A-009-N MEX-----	6D-----	Economics of alternative pricing systems to allocate scarce water supplies. Long.
A-010-N MEX-----	6G-----	A comparison of the aquatic beetles in the five major watersheds of New Mexico with special emphasis on the family Dytiscidae. Zimmerman.
NEW YORK		
A-001-NY-----	6D-----	Water supply demand. Allee.
A-002-NY-----	6B-----	Determining optimal policies for operating water resources systems. Lynn.
A-003-NY-----	6E-----	Water and related land resources law and political institutions I. Farnham.
A-007-NY-----	5C-----	Eutrophication of water resources in New York State. Barlow.
A-008-NY-----	2E-----	The hydraulics of channels, connecting two reservoirs. Graf.
A-009-NY-----	2H-----	Hydrologic systems analysis of the Great Lakes. Brutsaert.
NORTH CAROLINA		
A-001-NC-----	2A-----	Runoff from rainfall and topographical data and the routing of flow in streams. Amein.
A-003-NC-----	2L-----	Primary productivity studies in North Carolina salt marshes. Cooper.
A-004-NC-----	2E-----	A comparison of State water pollution control laws and programs. Heath.
A-005-NC-----	2K-----	Solubility equilibria involving metal oxides and corresponding aqueous metal perchlorates. Hentz.
A-007-NC-----	2F-----	Diffusion and dispersion in porous media. Kashef.
A-008-NC-----	2G-----	The movement and storage of water in North Carolina soils. Lutz.
A-009-NC-----	2F-----	Ground water yields in Raleigh quadrangle, N.C. Parker.
A-010-NC-----	2E-----	The effect of different low-flow hydrologic regimes on water quality management. Sherwani.
A-011-NC-----	6D-----	Criteria for evaluating the quality of water based recreation facilities. Stott.

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*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
NORTH DAKOTA		
A-001-N DAK.....	6D.....	Closed circuit water systems for livestock production. Pratt.
A-002-N DAK.....	5D.....	Treatment of lye peel potato wastes by coagulation. Fossum.
A-003-N DAK.....	4D.....	Microbiology of sewage-lagoons—Role of purple-sulfur bacteria in stabilization of industrial wastes. Vennes.
A-004-N DAK.....	4C.....	Water quality in relation to productivity of Lake Ashtabula Reservoir in southeastern North Dakota. Whitman.
A-005-N DAK.....	4C.....	Effect of water quality and management on chemical and physical properties of selected soils under irrigation. Schroer.
A-006-N DAK.....	2K.....	The biogeochemistry of Devils Lake, N.Dak. Tubb.
A-007-N DAK.....	5C.....	Mussels and pollution in the Red River drainage, North Dakota and Minnesota. Cvancara.
A-008-N DAK.....	2D.....	The determination of suitable average values of meteorological data for use in estimation of evapotranspiration from free water surfaces and soil surfaces. Schwendeman.
OHIO		
A-001-OHIO.....	5G.....	Development of a "natural" laboratory for study of acid mine drainage. Smith.
A-002-OHIO.....	5G.....	A study of the microbial flora of acid waters. Dugan.
A-003-OHIO.....	5G.....	A biological survey of acid mine waters. Dambach.
A-004-OHIO.....	5B.....	A study of groundwater contamination due to saline waste water disposal in Morrow County oilfields. Lehr.
A-005-OHIO.....	6B.....	Alternative economic responses to the acid mine drainage problem in southeastern Ohio. Tybout.
OKLAHOMA		
A-001-OKLA.....	5C.....	Ecological factors affecting turbidity and productivity in prairie ponds in the southern Great Plains. Dorris.
A-002-OKLA.....	5C.....	Chemical and thermal characteristics of Keystone Reservoir. Dorris.
A-003-OKLA.....	5F.....	Development of design criteria for individual domestic water supplies from surface impoundments. Daniel.
A-004-OKLA.....	3F.....	Reduction of water application losses through improved distribution channel. Garton.
A-005-OKLA.....	3B.....	Water yield as influenced by watershed characteristics and small upstream reservoirs. Garton.
A-006-OKLA.....	2A.....	The mechanism of direct surface runoff from rainfall. Garton.
A-007-OKLA.....	5D.....	Enzymes and catalysts for purification of industrial waste water. Fulton.
A-008-OKLA.....	1A.....	Oxygen diffusion in semiquiescent waters. Gaudy.
A-009-OKLA.....	3A.....	Thermodynamic properties of brine. Rowe.
OREGON		
A-001-O REG.....	2E.....	Hydrology of water yield prediction. Krygier.
A-002-O REG.....	6E.....	Appraisal of water management institutions. Clark.
PENNSYLVANIA		
A-001-PA.....	5D.....	Sewage oxidation rates in neutralized acid mine water stream. Kountz.
A-002-PA.....	5F.....	Crushed limestone barriers for neutralization of acid stream. Kountz.
A-003-PA.....	5C.....	The effects of nutrients additions and stream dynamics on stream eutrophication. McDonnell.
A-004-PA.....	5D.....	Removal of both metal and detergent contaminants in streams by foam fractionation. McLean.
A-005-PA.....	6G.....	The carbonate hydrogeologic environment, its relationship to land use, water resources development and management. Parizek.
A-006-PA.....	2E.....	Characteristics of streamflow of small watersheds in Pennsylvania and influencing factors. Sopper.
A-007-PA.....	6D.....	An economic analysis of water utilization in Pennsylvania. Blood.
A-008-PA.....	5A.....	An evaluation of the significances of escherichia in sewage effluent and water supplies. Glantz.
A-009-PA.....	6B.....	A water-supply demand analysis in Clinton County, Pa.—Study in economic hydrology. Raphael.
PUERTO RICO		
A-001-PR.....	5A.....	Determination of safe levels of pollution in Puerto Rico. Santiago-Vazquez.
A-002-PR.....	2A.....	Quantitative analysis of water use patterns in Puerto Rico. Santiago-Vazquez.
A-004-PR.....	3B.....	Development of ground water control methods for the heavy soils in Lajas Valley. R. Vazquez.
A-005-PR.....	2I.....	Water requirements by sugarcane under irrigation. R. Vazquez.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
RHODE ISLAND		
A-001-RI-----	2I-----	Water loss through interception by mixed oak forests in Rhode Island. Brown.
A-002-RI-----	5A-----	Structural chemistry of yellow organic matter in fresh water. Felbeck.
A-003-RI-----	5B-----	Movement of manganese into ground water supplies. DeLuise.
A-004-RI-----	5A-----	Analysis of the effluent from a nuclear fuel recovery plant. Blecharczyk.
A-006-RI-----	8B-----	Static and dynamic behavior of soils. Nacci.
A-007-RI-----	5G-----	The effect of obstructions on the re-aeration of flowing streams. Hagist.
A-008-RI-----	2F-----	Potential ground water hydrologic characteristics of glacial deposits as determined by electric resistivity criteria. Fisher.
A-009-RI-----	2I-----	The water economy of turf grass. Stuckey.
A-010-RI-----	6D-----	Variations in water consumption based on economic and social characteristics of the household. Spaulding.
A-011-RI-----	2K-----	Analysis of natural radioelements in raw water. Rose.
A-012-RI-----	3A-----	Scale reduction in desalination by calcium sulfate solubility inversion. Thompson.
A-013-RI-----	2K-----	An investigation of the interrelationship of organic matter and trace elements in fresh water. Corless.
A-014-RI-----	5G-----	Development of methods for controlling the copper content in water. Mairs.
A-015-RI-----	5G-----	Oxygen transfer in aeration process. Poon.
SOUTH CAROLINA		
A-001-SC-----	5C-----	Effect of pesticides on the ecology of fresh water organisms. Reed.
A-002-SC-----	6B-----	Study of relationships between pollution and industrial development in South Carolina. Stepp.
A-003-SC-----	2A-----	Hydrology of the root zone. Lambert.
A-004-SC-----	2J-----	Bedrock influence on sediment load of selected Hartwell Reservoir tributaries. Brown.
A-005-SC-----	2A-----	Temperature study of ground water-surface water relationship. Law.
A-006-SC-----	2D-----	Relation of soil properties to evaporation of water from soils. Peele.
A-007-SC-----	5C-----	Water quality and waste assimilation capacity studies of an impoundment of recent origin. Wallace.
SOUTH DAKOTA		
A-001-S DAK-----	6B-----	Economic potentials for water resources development on South Dakota. Helfinstine.
A-002-S DAK-----	2H-----	Water quality and primary production of South Dakota lakes. Schoenthal.
A-003-S DAK-----	5E-----	Investigation of the influence of waste disposal practices on ground water qualities. Anderson.
A-004-S DAK-----	2F-----	Determination of porosity and permeability of selected sandstone aquifers. Gries.
A-005-S DAK-----	2D-----	Correlating soil moisture conditions and microclimate with evaporation losses and water requirement of plants. Horton.
A-006-S DAK-----	3F-----	Influence of low rates of water application by sprinklers on the microclimate. Wiersma.
A-007-S DAK-----	2J-----	Apparent viscosity of fine material concentration as it affects sediment transport and velocities in open channel flow. Alger.
A-009-S DAK-----	9C-----	Establishment of water quality laboratory and systems for storage and retrieval of information for the South Dakota State University. Wiersma.
TENNESSEE		
A-001-TENN-----	2E-----	Fundamentals of turbulent mixing. Peebles.
A-002-TENN-----	3B-----	Factors affecting water yields from small watersheds in Tennessee. Shelton.
A-003-TENN-----	8A-----	Small reservoir sealing. Sewell.
A-004-TENN-----	5D-----	An investigation of surfactant removal. Whatley.
A-005-TENN-----	5G-----	A study of the survival of bacterial indicators of pollution in natural waters. Womack.
A-006-TENN-----	5G-----	An investigation of the effect of controlled releases on the physical, chemical, and bacteriological characteristics of Fort Loudon Reservoir. Larson.
A-007-TENN-----	9A-----	Seminars and conferences. Larson.
TEXAS		
A-001-TEX-----	6D-----	Future agricultural water requirements. Smerdon.
A-002-TEX-----	2A-----	Morphology of precipitation and runoff. Clark.
A-003-TEX-----	5G-----	Influence of fatty alcohols and acids on the clarity and biota of impounded reservoirs. Davis.
A-004-TEX-----	6A-----	Development of optimization-system analysis techniques for Texas water resources.
A-005-TEX-----	7A-----	Status evaluation of surface waters in Texas. Clark.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
UTAH		
A-001-UTAH-----	6E-----	Cultural, social organizational, and social psychological factors associated with proposed changes in water usage patterns. Bylund.
A-002-UTAH-----	7B-----	Instrumentation and development of techniques to measure and evaluate meteorological properties important to hydrology. Ashcroft.
A-003-UTAH-----	5G-----	A study of the biological, chemical, and physical nature of water quality factors under Utah conditions. Neuhold.
A-004-UTAH-----	2I-----	Evaluation and development of advanced spectral photographic methods for determining relative water use by vegetative cover on natural watersheds. Haws.
A-005-UTAH-----	9A-----	Identification and planning of water research needs. Peterson.
VERMONT		
A-001-VT-----	5C-----	Limnology of Lake Champlain. Potash.
A-002-VT-----	2E-----	Role of basin physiography on the runoff from small watersheds. Ragan.
A-003-VT-----	2J-----	Bottom sediments of Lake Champlain. Hunt.
A-004-VT-----	2H-----	Physiology and ecology of nematode fauna of Lake Champlain. Fisher.
VIRGINIA		
A-001-VA-----	5D-----	Concentration of phosphate sludges. Parsons.
A-002-VA-----	1B-----	Fundamental study of multicomponent mass transport in aqueous and membrane systems. Wills.
A-004-VA-----	2A-----	Evaluation of geohydrologic factors in estimation of runoff coefficients in watershed embracing multiple geologic terranes. Cooper.
A-005-VA-----	5B-----	Evaluation of the effects of trace elements on the activity of microorganisms with special emphasis on the lactic streptococci. Benoit.
A-006-VA-----	4A-----	Flood damage abatement study for Virginia. Walker.
A-007-VA-----	5G-----	Queueing model for pollution transport in streams. McJunkin.
A-008-VA-----	6E-----	Study of water resources laws for Virginia. Walker.
A-009-VA-----	4A-----	Relation of selected engineering land treatments to soil water storage and rainfall use efficiency by crops. Lillard.
A-010-VA-----	5G-----	Water quality in relation to aquatic plants and their control. Evrard.
WASHINGTON		
A-001-WASH-----	2G-----	A study of infiltration beneath a forest floor. Campbell.
A-003-WASH-----	6A-----	Simulation of a water resource system. Bevan.
A-004-WASH-----	8A-----	A comprehensive study of the fluid mechanics of downstream migrant fish passage structures. Richey.
A-005-WASH-----	6G-----	Some effects of water impoundments on waterfowl populations and reproduction on the Snake River, Wash. Buss.
A-006-WASH-----	3H-----	Drainage theory for removing excess water from irrigated lands. Jensen.
A-007-WASH-----	2F-----	Methods of investigating ground-water recharge near the margins of plateau basalts. Crosby.
A-008-WASH-----	5F-----	Evaluation of factors affecting stream self-purification. Proctor.
A-009-WASH-----	2E-----	Determination of flows for ungaged streams. Bender.
A-010-WASH-----	6G-----	Distribution of planktonic fish eggs. Saunders.
A-011-WASH-----	6G-----	Distribution and ecology of nematodes in irrigation water. Faulkner.
A-012-WASH-----	6G-----	Effect of dam construction on downstream water temperature. Nece.
A-013-WASH-----	6D-----	The role of industrial process changes in affecting water requirements. Iulo.
WEST VIRGINIA		
A-001-WVA-----	5C-----	Ecological and physiological relationships of Monongahela River fish populations to acid mine pollution. Bensou.
A-002-WVA-----	5D-----	Acid mine drainage microbiological studies. Wilson.
A-003-WVA-----	2A-----	Runoff studies on small watersheds. Burchinal.
A-004-WVA-----	8A-----	The hydrologic design of small drainage structures in West Virginia. Burchinal.
A-005-WVA-----	2I-----	An investigation of the distribution and abundance of vascular aquatic plants in the Monongahela River Basin above Point Marion, Pa., with special reference of the influence of water quality on these plants. Clarkson.
A-006-WVA-----	2B-----	Influence of topographic features on rainfall in West Virginia. Dickerson.
A-007-WVA-----	5C-----	Algal relationships to the recovery of acid mine streams. Bennett.
A-008-WVA-----	2K-----	Geochemical behavior of iron and manganese in a reservoir (Lake Lynn, W. Va.) fed by streams containing acid mine drainage. Corbett.
A-009-WVA-----	2A-----	Geochemical and sedimentological analysis of the Tygart River Reservoir. Collin.

See footnote at end of table.

*List of research projects by States under annual allotment program (sec. 100)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
WISCONSIN		
A-001-WIS-----	5C-----	Use of lake sediment cores to estimate the rate of eutrophication of lakes. Lee.
A-002-WIS-----	5C-----	Biological aspects of eutrophication on Lake Mendota, Crystall, and Trout Lake, Wis. Halsey.
A-003-WIS-----	3C-----	Methods for harvesting or control aquatic plants. Grant.
A-004-WIS-----	5H-----	Circulation and mixing processes in lakes. Hoopse.
A-005-WIS-----	2F-----	Unsteady flow of ground water and dispersion in ground water movement. Monkeneyer.
A-006-WIS-----	3D-----	An investigation of the relationship between the filtering properties of particulates in water and the filter medium as applied in water reuse system. Polkowski.
A-007-WIS-----	6D-----	A model to estimate the economic effects water-based recreation projects on local political subdivisions. Lord.
A-008-WIS-----	6E-----	Legal-economic analysis of irrigation in Wisconsin. Rose.
A-009-WIS-----	5G-----	Water quality management on the Wisconsin River, a model study of the technical, economic, legal, financial, and administrative aspects. Beuscher.
WYOMING		
A-001-WYO-----	6A-----	Water resource operations study. Bellamy.

¹ Based on COWRR's listing of Water Resources Research Categories dated Aug. 13, 1965.

*List of research projects by States under matching grant program (sec. 101)
approved in fiscal year 1966*

Proposal No.	FCST ¹ categories	Title and principal investigator
ALABAMA		
B-001-ALA-----	5C-----	Study of the effects of surfactants on the aqueous solubility of oxygen and hydrogen sulfide. Dinius.
MGA-860-----		
B-003-ALA-----	2F-----	Geophysical prospecting for ground water in the Piedmont area, Alabama. Warman.
MGA-869-----		
B-004-ALA-----	2F-----	The effects of temperature and density gradients upon the movement of contaminants in saturated aquifers. Henry.
MGA-870-----		
ALASKA		
B-001-ALAS-----	2C-----	Saline conversion and ice structures from artificially grown sea ice. Peyton.
MGA-871-----		
B-003-ALAS-----	6D-----	An analysis of the demands for water from the private sector in a subarctic area. Haring.
MGA-872-----		
ARIZONA		
B-001-ARIZ-----	5A-----	Trace and tracer elements in ground water. Dutt and Maier.
MGA-842-----		
CALIFORNIA		
B-001-CAL-----	6A-----	Optimization of water resources development. Oliver.
MGA-843-----		
B-002-CAL-----	7B-----	Induced electrical polarization and ground water. Ward.
MGA-828-----		
B-008-CAL-----	6B-----	On-farm irrigation water supplies and costs in relation to cropping systems and production adjustments in the Sacramento Valley. Hedges.
MGA-829-----		
B-009-CAL-----	6E-----	The development of water resources in California in relationship to plans and programs for western regional water development. Engelbert.
MGA-865-----		
B-012-CAL-----	8A-----	The mechanics of open channel flow systems. Amorochio and Strelkoff.
MGA-856-----		
B-017-CAL-----	6A-----	A dynamic input-output and mathematical programming analysis of western regional water resources. McGaughey.
MGA-886-----		
COLORADO		
B-001-COLO-----	3F-----	Hydraulic operating characteristics of low gradient border checks in the management of irrigation water. Evans and Heermann.
MGA-840-----		
B-006-COLO-----	6E-----	An exploration of components affecting and limiting policymaking options in local water agencies. Hill.
MGA-852-----		

See footnote at end of table.

*List of research projects by States under matching grant program (sec. 101)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
DELAWARE		
B-001-DEL----- MGA-873	6G-----	Economic and engineering aspects of water in Delaware's agri-business industry. Smith.
GEORGIA		
B-002-GA----- MGA-836	2H-----	A study of the water quality gradients in Lake Sidney Lanier, Ga. Hewlett, Barnhart, and Holder.
B-003-GA----- MGA-849	5G-----	Fresh-water canal as a barrier to salt-water intrusion. Carstens.
B-004-GA----- MGA-835	2J-----	The effects of a permeable bed on sediment motion. Martin.
B-009-GA----- MGA-874	6G-----	Interrelations between river basin developments and metropolitan areas. Kelnhofer.
B-011-GA----- MGA-875	6D-----	The demand and price structures for water in a humid area. North.
ILLINOIS		
B-001-ILL----- MGA-887	5B-----	Distribution of drift organisms in relation to pollution and the impoundment of the Kaskaskia River. Larimore.
B-002-ILL----- MGA-876	2G-----	Non-Darcy flow characteristics of water as influenced by clay concentration and swelling pressure. Miller.
IOWA		
B-001-IA----- MGA-888	6E-----	Study of operation of the Iowa water permit system. Hines.
KANSAS		
B-001-KAN----- MGA-830	5G-----	Optimal aeration systems. Erickson.
B-003-KAN----- MGA-851	4B-----	Storage of fresh water in underground reservoirs containing saline water. Green.
LOUISIANA		
B-001-LA----- MGA-857	8A-----	Measures to protect the ground water supply of the Baton Rouge area from salt water encroachment (engineering and economic phases.) Kazimann.
MARYLAND		
B-001-MD----- MGA-877	5G-----	Enhancement of recreational uses of estuarine waters through study of potential control methods for stinging nettles. Cargo.
MINNESOTA		
B-001-MINN----- MGA-862	6G-----	Diatoms and zooplankton in Minnesota lakes. Wright.
B-002-MINN----- MGA-825	4A-----	The effect of the natural sealing off potholes upon water movement and ground water resources. Manson.
B-003-MINN----- MGA-889	2G-----	Storage and movement of water in soils as related to spacial and time change in the clay-quartz matrix. Blake.
B-005-MINN----- MGA-844	2G-----	Vertical migration of moisture in the soil induced by winter thermal gradients and its influence upon spring water resources. Baker.
B-007-MINN----- MGA-890	2A-----	Study of factors affecting the channel phase of runoff from small watersheds by mathematical modeling. Larson.
MISSOURI		
B-001-MO----- MGA-832	5C-----	The effects of heated water, acid mine drainage, and alkaline ash drainage on water quality and community metabolism of a 1,500-acre reservoir. Campbell.
B-002-MO----- MGA-831	2K-----	Geochemistry and origin of sulfosaline ground water, Saline County, Mo. Carpenter and Miller.
B-004-MO----- MGA-850	2F-----	Drilled well investigation of Dolomite aquifer characteristic. Maxwell.
B-005-MO----- MGA-838	2G-----	The availability of subsurface water in Missouri for consumptive use by plants. Decker and Scrivner.
B-007-MO----- MGA-878	2A-----	Investigation of the spatial behavior of roughness in laboratory watersheds under conditions of spatially varied unsteady flow. Harbaugh.

See footnote at end of table.

*List of research projects by States under matching grant program (sec. 101)
approved in fiscal year 1966—Continued*

Proposal No.	FCST ¹ categories	Title and principal investigator
MONTANA		
B-002-MONT----- MGA-867	7B-----	A proposal to study hydrological data acquisition through remote reconnaissance systems. Garlach and Ward.
B-003-MONT----- MGA-854	2C-----	The nature of snow cornice accumulation on a mountain ridge and devices for prevention or control of these features in the northern Rocky Mountains. Montagne, Townes, and Super.
B-004-MONT----- MGA-855	6E-----	Administrative arrangement for water resources development. Sheridan and Holje
B-006-MONT----- MGA-868	7B-----	Instrumentation of remote areas. Weaver.
B-009-MONT----- MGA-879	5B-----	Industrial organic micropollutants and protozoa. Rowan.
NEVADA		
B-001-NEV----- MGA-848	3F-----	Evaluation of parameters of irrigation water usage in Nevada. Bourns.
B-004-NEV----- MGA-880	4B-----	Conjunctive use of ground water and streamflow in Humboldt River Basin, Nev. Maxey.
NEW MEXICO		
B-001-N Mex----- MGA-846	6D-----	Recreational values of water in the major reservoirs of New Mexico. Gray.
B-002-N Mex----- MGS-853	2F-----	An appraisal of some of the factors adding to or detracting from the socioeconomic use of New Mexico's thermal waters. Bertholf and Summers.
B-003-N Mex----- MGA-881	2A-----	Reconnaissance study of the Pecos River Basin, N. Mex. Hernandez.
NEW YORK		
B-002-NY----- MGA-823	6D-----	The impact of water-based recreation. Burgess.
B-003-NY----- MGA-891	6E-----	Investigation of water rights and water law and the effects of these on the development and utilization of water resources of New York. Farnham.
NORTH DAKOTA		
B-001-N DAK----- MGA-882	5A-----	A limnological study of Spiritwood Lake, N. Dak., with special emphasis on its water quality, seasonal cycles of chemical nutrients, phytoplankton, zooplankton, and primary production. Comita.
OHIO		
B-002-OHIO----- MGA-841	5C-----	Strip mining and water quality. Vimmerstedt, Struther, Finney.
B-004-OHIO----- MGA-847	2K-----	Strontium isotope composition and trace element concentration in Lake Huron and its principal tributaries. Faure.
B-005-OHIO----- MGA-866	6A-----	Hydrologic investigation of small watersheds in Ohio. Taiganides.
OKLAHOMA		
B-004-OKLA----- MGA-883	5G-----	Critical review of the Oklahoma State water resources quality criteria. Reid.
OREGON		
B-001-ORE----- MGA-884	2G-----	Prediction of unsaturated flow rates from physical properties of porous medium. Boersma.
PENNSYLVANIA		
B-001-PA----- MGA-837	3C-----	Renovation of waste water through application to agricultural cropland and forest land. Kardos, Sopper, and Myers.
B-003-PA----- MGA-839	5F-----	Thermodynamics of reactions in acid mine drainage. Barnes and Romberger.
SOUTH CAROLINA		
B-001-S CAR----- MGA-863	2D-----	Physical, meteorological, and hydrologic aspects of evapotranspiration. Lambert.
TEXAS		
B-001-TEX----- MGA-885	5B-----	The economic impact of water impoundment: A comparative projection model. Pearson.

See footnote at end of table.

List of research projects by States under matching grant program (sec. 101) approved in fiscal year 1966—Continued

Proposal No.	FCST ¹ categories	Title and principal investigator
UTAH		
B-001-UTAH MGA-892.	2A-----	Hydrologic Atlas of Utah. Bagley.
B-003-UTAH MGA-834.	6B-----	Secondary economic impact from water resources development. Whaley.
B-004-UTAH MGA-827.	6D-----	Economic effects of water allocation among alternative industrial (nonagricultural) uses. Harline.
B-005-UTAH MGA-864.	6A-----	Application of electronic analog device to solution of hydrologic and river basin planning problems. Chadwick and Bagley.
B-008-UTAH MGA-833.	6D-----	Recreation value of water in mutually exclusive setting. Whaley.
B-009-UTAH MGA-826.	6B-----	The value of water in complementary industry complexes. Roberts.
WASHINGTON		
B-003-WASH MGA-893.	2L-----	Estuarine water quality and fish distribution. Bevan.
B-004-WASH MGA-824.	5C-----	Water quality as related to the survival of salmon eggs and larvae. Bevan.
B-005-WASH MGA-845.	5A-----	Investigation of the techniques to provide advance warning of ground water pollution hazards, with special reference to aquifers in glacial outwash. Crosby.
WISCONSIN		
B-002-WISC MGA-861.	6F-----	Physical techniques and institutional mechanisms for integrated adjustment within flood plain hazard zones through the use of the detailed soil survey. Yanggen.
B-004-WISC MGA-858.	5B-----	The nitrogen cycle in surface and subsurface waters. Witzel.
B-008-WISC MGA-894.	5G-----	Insecticide adsorption by lake sediments as a factor controlling insecticide accumulation in lakes. Chester.

¹ Based on COWRR's listing of water resources research categories dated Aug. 13, 1965.

Dr. RENNE. Mr. Chairman, I would like to make just a brief progress report to bring us up to date, and in the process I think I can point out some aspects of our total program that would be affected if title II were implemented.

As you all know, we funded 14 of the institutes last January a year ago. This was a group selected from 43 institutions that had qualified by December 6, 1964, after receiving the necessary rules of the game, as it were, for qualification from the Office of Water Resources Research in the Department of Interior. They had about 6 weeks in which to prepare the supporting information. Those 43 qualified as of December 6, but all 51 of the research institutes in the 50 States and Puerto Rico had qualified by February of 1965. All were funded of course by the middle of May in 1965, because of the second supplemental appropriation, which made it possible to allot some \$52,000-plus to each of the 37 centers that were not funded in January with the first appropriation which the Congress made for this work.

What I am trying to say is that the annual report which you have, and our first annual report, covers then the work of 14 of the centers for less than 6 months, and 37 institutes for about 6 weeks.

Now since that time I think we have made some very real progress.

First of all, we have strengthened by correspondence, by consultation, by visits—we have strengthened and focused the attention of these centers on what we feel are the highest priorities of water resources research based upon the best information we feel that is avail-

able through those who have worked on this program. I am speaking now of the Office of Science and Technology, its Water Resources Committee. Dean Peterson is here and Dean Peterson will be testifying later, so I will not say much more than that except to say that four-fifths of our projects that are now in operation fall into the highest five priorities as mentioned in their report, the Office of Science and Technology 10-year water resources research program.

As you know, those five are: first, the research for perfecting water resources planning; second, research on economic, legal, social, and related aspects of water resources; third, ground water research; fourth, water quality research; and fifth, research on water-plant-soil relationships. I say better than 80 percent, better than 4 to 5 of all of our projects that are now current under our program, both the matching and the allotment—and Mr. Aspinall, I did not mention the matching grants in my statement, but I have computed also the matching projects, and they run an even higher percentage of the total that fall under these top priorities.

As a matter of fact, it is about 87 percent, which is another way of saying that in the national competition under the matching program, there is an even higher emphasis on these five priorities than in the allotment projects.

At the same time, over four-fifths of the allotment projects fall into these five categories.

The CHAIRMAN. Did you say national competition?

Mr. RENNE. Yes; because the matching fund projects are what we call national competition in that we are considering all projects received from all 11 of the centers, all of those who submit projects for matching are in the competition for the funds that are available. So we refer to that as national competition among the whole 51.

One hundred and thirty-nine projects have been submitted to us for matching this year. This is more than five times the amount last year. And after we funded 71 of those with the \$1.5 million that had been made available, and rejected 21, there are still 60 projects that have not been funded, sort of a backlog, that have a value in their requests of some \$2,086,000. That is the request for Federal money, so that actually there would be more than \$4 million tied up in the 60 projects, because they have to have at least 50 percent to go with the Federal money, or half of the total, or \$2 million from them and \$2 million from Federal.

There are 26 nonuniversity centers now participating in the program. Of this 26 that are not centered at universities, 3 of them are private institutions.

Princeton, which has one project under the Rutgers allotment program; Clark University, which has one project under the University of Massachusetts center program; and Ashland College in Ohio has one project with the Ohio State University Water Research Center.

The other 23 are mostly institutions that are in the same general administrative arrangement with the land-grant university in the State. Most of them have a common board. Some do not. But the 23 are largely made up of institutions that are under the same general administrative authority, and of course a part of the same State.

I mention Washington, for example, the University of Washington in Washington State; in Montana, Montana State and Montana Uni-

versity and Montana College of Science, Technology & Engineering, institutions of that kind.

In North Carolina at Raleigh where the center is, and projects also at Chapel Hill.

We feel that we have made some very real progress in the coordination of our efforts to supplement on-going research work and not duplicate it.

This morning Congressman Aspinall referred to the Federal projects that are underway, 1,545 were listed in the catalog which was published by our Office, with the cooperation and assistance of the Science Information Exchange, and then the second catalog, 501 projects nonfederally supported, or a total of more than 2,000 projects.

We have a comprehensive set of key words for indexing and information retrieval that is about ready to come off the press. We feel that this is going to be very helpful.

We have gotten a very great deal of assistance from scientists and with persons familiar with the different areas of water research and water resources who have helped us in preparing, checking and getting as comprehensive and complete a list of words, keywords for indexing and information retrieval.

We have employed two or three consultants—four, I think, to be exact—to help prepare state of knowledge of an area, to enable us to get a better overall perspective of what is needed in a given field. And we have underway some comprehensive bibliographies in the social sciences dealing with water, for example, where, to the best of our knowledge, there is no such bibliography available.

On February 1, 1966, the Secretary, Mr. Stewart L. Udall, set up a water resources science information center in the Department of the Interior to improve communications, information, indexing and retrieval and dissemination on water resources scientific information. Ultimately other aspects will be included, but only the water resources phase so far is established and operating, and our Office has been given the responsibility in the Department for managing that water resources scientific information center.

We feel that this is very important to keep duplication, unnecessary and undesirable duplication to a minimum, and it will be especially important if title II is implemented.

In summary it seems to me that we are off to a good start, but I think I would be remiss in my responsibilities if I tried to pretend that we are tapping now the total water research competence of the Nation in our program, because we are not.

I do not think it is necessary for me to go into detail. In my prepared statement I mention several examples: For example, the State of Illinois, where there are eight universities; California, where there are nine universities just in the State university system alone, to say nothing of the University of Southern California, Cal Tech, Stanford, and some other very important universities.

We are also not drawing on the nonacademic, nonprofit agencies, like Batelle Memorial Institute, for example, or the Illinois Institute of Technology Research Center, or the Stanford Research Institute, and others of that kind.

We have received 68 proposals submitted for possible funding under title II, even though funds have not been available, and there are 41

new ideas or new procedures or proposals in the 68 that are not in any of the projects that we now have supporting.

This indicates to us that there are ideas, there are problems, there are techniques to be developed that are not now being covered in the title I program.

There are several areas as we see it at the moment—I am sure these will become perhaps larger as we become more familiar with the field, but there are four areas—where we believe that title II would be particularly effective. One is instrumentation projects. Another is mathematical modeling. A third is systems analysis. Also there are significant special water problems in the territories, Samoa, and the Virgin Islands particularly. Another research area deals with urban water problems, which was mentioned this morning, and which frequently became so large that they require concentrated attack, around the clock, so to speak, and are not very well adapted to the university academic arrangements because it is pretty difficult to have staff members away from the campus for an extended period of time.

Some of these projects lend themselves much better to nonacademic agencies, where there are large staffs that have specialized in a particular area of work, and from their experience in contracting have a great deal of proficiency in particular specialized areas applicable to water resources.

I want to make one more comment, and this is not in my prepared statement.

Much was said this morning about the matter of scarcity of water resource scientists, manpower shortage. I think it is not inconsistent to say at one time that there are shortages, and at the same time that we are not drawing on all of the manpower resources that are available, because in many of these institutions there are people who are working in their areas of competence: resource economics, sanitary engineering, civil engineering, geology; but were resources available, they could employ their talents, we feel, to very definite advantage in the solution of many of our water resources problems.

I recall this last spring, nearly a year ago now, five different institutions were trying to get a good ground-water geologist. They used the term "hydrologist." Three of them finally ended up by taking a staff member in one of their current fields and shifting him, as it were, transferring him because he felt he had some interest in water, and could develop, as it were, develop over a period of time into a pretty good water scientist.

One individual, particularly, a civil engineer, had indicated a particular interest in water, but had not had an opportunity, because previously there were not funds available for this type of work at that institution, and he is now involved in the program. So that there are some aspects like that.

Then again, of course, with new techniques developing so rapidly in this field of water resources, obsolescence becomes very pronounced, and some of us who were trained in earlier years find it increasingly difficult to keep abreast of all of the latest developments, try as we will. We appreciate that it is going to be necessary to give the opportunity for preparing good manpower resources for further research in the next few years. We must, of course, concentrate now if we are going to supply that need. We cannot expect 5 to 10 years from now to have

adequate manpower for our water resources research needs unless we give some attention to that aspect now.

As you know, we have no grants for scholarships or that sort of thing, but we feel that the program is working out very nicely because these advanced senior students and graduate students have been doing some pretty good research work under good direction from established water scientists that are the chief project investigators.

And so we get the training as a sort of additional dividend. But the research has, I think, been improved as a result, because all of you know that students who are getting an opportunity to be trained and to work in a field with the potentials that this has are going to burn the midnight oil and put in a tremendous number of hours and not just those for which they might be paid directly.

And so through the research program, I think we are preparing to meet manpower needs 5 and 10 years from now, when there certainly will be more need for additional scientists.

Mr. Chairman, I feel that that covers some of the things that I wanted to say, in bringing us up to date on where we are, and I will certainly be very glad to try to answer the questions that you may have.

The CHAIRMAN. This committee is privileged to have a prominent member of Government from a sister nation. We always call attention to this fact. We had walk into the room just a few minutes ago the Honorable Matiu Rata, Member of Parliament of Northern Maori.

Will you please stand up so that everybody can see you? Nice to have you here.

The gentleman from Idaho is recognized.

Mr. WHITE of Idaho. Thank you, Mr. Chairman.

I think Director Renne has given us a very good picture of what has happened so far, and the programs that are underway and what he feels should be done in this area.

I suppose if I were to read his full testimony I would find more in relation to title II than you gave us in these extemporaneous remarks.

The CHAIRMAN. You will have the time between now and tomorrow morning.

Mr. WHITE of Idaho. Yes, I will read it.

I just want to compliment him on his presentation and look forward to working with him very closely.

Thank you.

Dr. RENNE. Thank you.

The CHAIRMAN. Mr. Roncalio?

Mr. RONCALIO. Thank you, Mr. Chairman.

No questions. I appreciate the testimony.

The CHAIRMAN. The Chair was going to adjourn the meeting but I will take advantage of this time to ask a few questions.

How much moneys are being expended in 1966 for the program administered by you, Mr. Renne?

Dr. RENNE. You mean for administrative expenses?

The CHAIRMAN. No, no, for the whole program.

Dr. RENNE. The total?

Well, we have \$87,500 for each of the institutes. That is roughly \$4.5 million.

The CHAIRMAN. Do you not have anybody here with that information?

Dr. RENNE. Yes, I have it right here, Mr. Chairman.

The CHAIRMAN. Is it in your statement?

Dr. RENNE. Pardon me?

The CHAIRMAN. Is it in your statement?

Dr. RENNE. No, it is not.

I can give you the three—I do not think this is in the statement.

The CHAIRMAN. On page 1 of the supplemental material.

Dr. RENNE. It is in the supplemental material, Mr. Chairman.

The CHAIRMAN. It was placed in the record.

That is \$4,463,000 approved allotments to State universities. Then you show the matching fund grants, which I understand the institutes' contribution to that is \$795,723.

Dr. RENNE. Mr. Chairman, we have \$11½ million, and that has been allotted to the matching funds, matching projects, but the column 3 means that the amount budgeted by institutes in this current fiscal year is roughly \$796,000.

In other words, they are spending that much of their money this year on these projects, and the \$1.5 million which we have is the Federal amount for the completion of the project, which it will take to do the job. And the State institutes sooner or later will put in at least \$1.5 million to match the \$1.5 million we have.

But currently, their budgets call for this right-hand column of \$796,000.

The CHAIRMAN. And your administrative expense for 1966 is \$433,000?

Dr. RENNE. That is correct.

The CHAIRMAN. And what is the average personnel?

Dr. RENNE. A ceiling of 20.

The CHAIRMAN. A ceiling of 20?

Dr. RENNE. For all personnel.

The CHAIRMAN. What will be the corresponding figures for fiscal 1967, that is money requested and the amount of money which you will use for matching, and the amount of money that you have in mind for administration and the number of personnel.

Dr. RENNE. First the amount for the allotments will be the exact same amount, \$4,453,000 for 1967 fiscal year. The amount requested for matching funds is \$2 million, which is a half million dollars more than the \$1.5 million thus far made available in fiscal 1966.

The CHAIRMAN. Is that section 101?

Dr. RENNE. That is right.

That is \$1 million less than the authorization in the act, but the official request is for \$2 million.

In administration the request is for \$2,000 less in fiscal 1967, than the \$433,000 in fiscal 1966, or in other words, \$431,000 for fiscal 1967.

The CHAIRMAN. Will your number of personnel remain the same?

Dr. RENNE. The personnel total in 1967 will be 21. We have been automating a little in terms of our data processing, and our office operations, and from those savings we will have the funds to add one person and still be under our total 1966 budget.

The CHAIRMAN. So the record may be clear, if title I is fully implemented at the end of 5 years from the date of the act, it calls for the expenditure of \$10.1 million; is that correct?

Dr. RENNE. That is right.

The CHAIRMAN. And in title II—

Dr. RENNE. Plus administration, Mr. Chairman.

The CHAIRMAN. Plus administration?

Dr. RENNE. Yes.

The CHAIRMAN. And if title II were authorized, the ultimate expenditure under title II would be \$10 million a year, the ultimate for the last 5 years.

Can you see any difference, Dr. Renne, in leaving an unlimited term for the operation and administration of title I, and an unlimited term for the operation and administration of proposed title II?

Dr. RENNE. Can I see any difference in it?

The CHAIRMAN. Yes.

Dr. RENNE. Well, our Department's legislative report to you of May 28 expressed the Department's position on this, and there were two points raised: one, that the water research involves much long-term continuing research to meet the problems that seem to be on the horizon, and that unless there is some expressed continuity for some considerable period, we are not likely to get the commencing into this field of some of the scientists and research people we want. That is one argument.

The other of course is that these water problems will persist, and our capacity to deal with them and analyze them will grow in the future, but Interior's mission has been increasing in this water resources field into more important and more complex aspects, and as time goes on it is reasonable, I suppose, to assume that the program on a continuing basis would achieve more results. The lack of assurance perhaps might come from shorter periods of authorization and approval.

I, of course, have to go along with the Department's position on that, Mr. Chairman, which I am sure you understand.

The CHAIRMAN. I understand that, and several of us expressed the rather definite position on this particular part of the proposed title II. How long a leadtime would you have to have for a contract proposal?

In other words, very few contract proposals under title I or title II would run over 2 years, will they, 2 or 3 years?

Dr. RENNE. No; the common one is about 3 years.

We have some projects running 4 years and some projects running 5 years, but we have tried to insist upon specific phasing, which would make it possible to get the great majority of them to be completed in 3 years, so that we would be able to evaluate our results periodically.

The CHAIRMAN. Then the position taken by some of us, if it should happen to be the position of the committee on termination of the program, purely for the purpose of weighing the program at that time, would a 3-year period be a sufficient leadtime under your administrative procedures for continuing an orderly program?

Dr. RENNE. One difference in title II is that there is a requirement for additional time for negotiation.

I think by the very nature of the title II authorization, if it were to come, would require more effort on our part in dealing with certain types of agencies that would be involved in title II, to negotiate very carefully the terms of the contract, and perhaps a half-year would be a lead on that.

Of course, we have not had much experience in this field. We have not had any in this particular field. I am just observing from other agencies that do negotiate, and sometimes it requires a considerable amount of time to get a good job done.

The CHAIRMAN. What is the average amount in a contract?

Dr. RENNE. Well, under title I—

The CHAIRMAN. Up to date.

Dr. RENNE. Pardon me?

The CHAIRMAN. Up to date.

Dr. RENNE. Up to date it is about \$12,000 on average, which means about one good research man and an assistant, and some clerical assistance, not very large.

The CHAIRMAN. Do you think that the amount would be larger under title II?

Dr. RENNE. This is Federal money, Mr. Chairman.

The CHAIRMAN. This is Federal money?

Dr. RENNE. Yes.

The CHAIRMAN. Do you think the amount would be greater under proposed title II?

Dr. RENNE. I think there will be types of projects that will be particularly adapted to title II that will be large projects. I think when you get into urban water problems, you get into pretty sizable ones.

The CHAIRMAN. That brings me to my next question, which I expect you have already felt was coming.

What do you think will happen to your administrative personnel if we fully implement title I and title II?

Dr. RENNE. Mr. Chairman, under our legislative report that we have submitted, and that we submitted last May, we estimated 3.2 man-years. That includes consultants; 3.2 man-years additional for the operation of title II the first year, 5.2 for each of the succeeding 4 years, including consultants.

The CHAIRMAN. It would take approximately 26 additional personnel over the 10-year period, or at the beginning of the 6-year period; is that right, Mr. Eaton?

Mr. EATON. Perhaps I misunderstood you, Mr. Aspinall.

It is not 26 additional. It is only 5.2 additional.

The CHAIRMAN. Each year?

Mr. EATON. No, sir.

Dr. RENNE. The same.

Mr. EATON. This is the same 5.2 people each year, the same individuals.

The CHAIRMAN. In other words, you would end up then with—

Dr. RENNE. Twenty-six total.

The CHAIRMAN. About 26 people.

Let me ask you, Dr. Renne, how can you evaluate all of these contract research results with 26 people, and at the same time keep a going operation?

Dr. RENNE. Well, sometimes I have wondered a little bit, but actually, we have had tremendous fine cooperation from the other departments and the other agencies.

Our referral system has helped us a great deal.

The work that the Science Information Exchange has been doing with us in the listing of projects and every new project to be listed promptly has helped us a great deal in spotting places where we would be overlapping, and we have gotten some very good technical counsel from Departments like HEW and Agriculture and from our own U.S. Geological Survey, and other agencies, and the Corps of Engineers has been very helpful.

If time would permit, I would go on and explain the others, but I do think this is a very vital part of our program.

The CHAIRMAN. You see, to me title III is just as important as title I or proposed title II, and most certainly I do not want your operation down there to just result in a money-spreading operation. This is the last thing in the world—as I understand the position of these universities, they are running their share and they are more than likely as idealistic as anybody can be in their desires, but they are after their share of a program so that they, too, can contribute.

If you stay with a personnel load like your project, I think you are going to have a pretty hard time of evaluating everything that is proposed, and then evaluating the results, because the first time you come back here with a contract that appears to me as a layman that you have duplicated a contract that you have already let out and have finished, then you see I hit the ceiling.

Dr. RENNE. Yes, sir; I would too.

The CHAIRMAN. This is going to make it very difficult.

Dr. RENNE. One sort of arrangement that enables us to get along with a small staff is this: For example, that instead of our trying to set up a fiscal review and audit section in OWRR, the regular Interior Department audit section will handle that work. We will, of course, pay the cost of the addition work that is involved in auditing our projects. But it will mean, I am sure, a much lower total cost to reap the advantage of economies of scale, because the Department audit section already is in that kind of work, it makes a business of it. In many cases those auditors will be going to the same cities where these institutes of ours are located on other work.

The CHAIRMAN. Do you have access to a computer operation?

Dr. RENNE. Yes.

The CHAIRMAN. Do you feed into a computer the necessary words and come out with the answer to a question of whether or not this problem has ever been researched before?

Dr. RENNE. I am going to let Mr. Eaton answer that one.

The CHAIRMAN. Really that is what I want to find out.

Mr. EATON. Yes, sir; we have access to such automatic data processing along the lines that you indicated, in two sources that we are currently using.

The Science Information Exchange, which has been designated by the President as the cataloging center for the entire Federal water research effort, in accordance with section 305 of the 1964 act, uses computers for automatic data processing of all of the ongoing projects which receive Federal support, and for many non-Federal projects which are fed into the system on a voluntary cooperative basis. This formed the source material for those thick catalogs which were published by our office, and copies of which I believe have been supplied to the committee on several occasions.

The CHAIRMAN. Is it your responsibility, or do you have any responsibility in determining the words and the factors to be used in your IBM computer operation?

Mr. EATON. This is a cooperative operation between ourselves in the Department of the Interior and the Science Information Exchange. As Dr. Renne mentioned in his comments, we are in the final stages of completing a cooperative undertaking with the Science Information Exchange to develop an agreed-upon vocabulary of indexing and retrieval terms. This is an operation which is done as a contract which we funded, and it is one of the costs that we show as costs of administration. It is in that \$430,000 item.

This we believe, and the very considerable number of experts who have participated in the job support our confidence in this, that this new indexing and retrieval vocabulary is going to very greatly increase the usefulness of this system.

The CHAIRMAN. So when Dr. Morgan of Colorado State University comes in with a proposed contract for research money, you can feed that question into your computer system and see whether or not that has ever been researched heretofore, and if it has, then you can go to the material that comes out to show to what extent it has been researched; is that correct?

Mr. EATON. That is correct.

I would like to add that in addition we feel that a possibly even more useful aspect is that the man, let's say on Dr. Morgan's campus, who is interested in undertaking this research, before he ever writes up the proposal and sends it in to us, will have access to that. Right from the start the research man can find out who has done what in this field, and he will look that over. Our regulations require that he look this over, and give us an analysis of what comes out of the machine.

The CHAIRMAN. You do not pay him for that looking over?

Mr. EATON. That is correct. That is part of his scientific foundation.

The CHAIRMAN. I only used Dr. Morgan because he is a constituent of mine. That is the only reason I was using him.

I think that this perhaps is rather satisfying to those of us who are working in this matter to know that there is a rather speedy way by which to determine whether or not we have duplication in what is proposed.

Your statement is that there are 1,545 Federal projects, and 500 plus non-Federal project research activities going on at the present time, which makes in the neighborhood of 2,050 or 2,100.

Have you gone through this evaluation process yet?

How many research operations in water have we had heretofore?

Dr. RENNE. You mean before this year?

The CHAIRMAN. No, before this project started.

Have you filed into your machine the material so that you know how many research activities, specific research activities in water, have been engaged in before we started this program we are discussing today?

Dr. RENNE. We are in process of working on that to find that.

We have rejected projects because the information that comes out now indicates that this one is already being attacked; this problem.

Also the fact, as Mr. Eaton pointed out, that this happens at the State center level, precludes a lot of them getting to us that would be obviously duplicating. So we have a doublecheck, and I think it

is pretty evident that with only 11 in the matching fund area, for example, that were rejected because of outright duplication, that the machinery is working pretty well.

The CHAIRMAN. Of course, if it were filled up completely we would have the answers to some of these questions that have been asked here today.

Dr. RENNE. Yes; we are not perfect yet.

The CHAIRMAN. As to the activity heretofore.

Our hour has arrived. We will proceed in the morning at 9:45.

(Whereupon, at 4:30 p.m., the committee recessed, to reconvene at 9:45 a.m., Tuesday, February 15, 1966.)

(However, the following pages of Friday, February 18, 1966, have been inserted at this point in the record in order that Dr. Renne's testimony may appear in the printed hearing uninterrupted.)

WATER RESOURCES RESEARCH

FRIDAY, FEBRUARY 18, 1966

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to adjournment, at 9:45 a.m. in room 1324, Longworth House Office Building, Hon. Wayne N. Aspinall (chairman of the full committee) presiding.

Mr. ASPINALL. In the absence of the chairman of the Subcommittee on Irrigation and Reclamation, the chairman of the full committee will act as the chairman at this session this morning.

The meeting was called today for the purpose of concluding, if possible, testimony and questioning of Dr. Renne, Director of the Office of Water Resources Research of the Department of the Interior. At our last meeting Dr. Renne had concluded his presentation before the committee. He was accompanied at the witness table by Mr. Eaton, Associate Director of the Office of Water Resources Research. Those present at the end of the last session had finished their questioning of Dr. Renne, that is, Mr. White and, I believe, Mr. Roncalio, and the chairman of the full committee had spent some time questioning Dr. Renne but had not gotten into the main questions which the committee's staff and the chairman had prepared.

Dr. Renne, I wish you and Mr. Eaton would come to the witness table and that you would take a few minutes to kind of review the testimony you gave at our last meeting, because we have two members who were not here at the last meeting, then I shall proceed to finish my questioning and the other members may question you further if they so desire.

STATEMENT OF DR. ROLAND R. RENNE, DIRECTOR, OFFICE OF WATER RESOURCES RESEARCH, DEPARTMENT OF THE INTERIOR; ACCOMPANIED BY E. D. EATON, ASSOCIATE DIRECTOR, OFFICE OF WATER RESOURCES RESEARCH, DEPARTMENT OF THE INTERIOR

Dr. RENNE. Very good, Mr. Chairman. I will very briefly summarize some of the statements which I made last Monday that do not appear in the prepared statement.

First of all, as a progress report, all 51 of our water resources research centers authorized in the act are now operating. Fourteen of these were funded last January 1965, a year ago, and they have had practically a full calendar year of operations. The other 37 were

funded in May when the second supplemental appropriation was made available by the Congress, which meant they had in fiscal year 1965 only approximately 6 weeks for operations, and it means these 37 have now had about 8 months of operations.

We have two reports that have now come in which summarize the research which has been done on two projects that have been completed.

We feel that during this first year we have been able, by consultation and by visits and by correspondence, to strengthen the programs by pointing out areas where we feel additional research is needed and where problems that seem to be quite relevant to the areas concerned should really be given some study.

We have been pleased this past year with the numbers and quality of matching fund requests that have come to us, a total of 168. We have funded 87 of these with the \$1.5 million available for this year plus the one-quarter million dollars received in fiscal year 1965. We have returned 21 for revision or reorientation. Sixty remain to be funded which we consider meritorious, requesting a little over \$2 million, which, of course, with the \$2 million that would be their part of the matching, would mean \$4 million worth of research.

There are 26 noncenter universities that are participating in the program with the 51 center universities, making a total of 77 universities that are now actually engaged in specific research projects under the program.

There are 471 projects currently; 384 of these are the allotment programs financed with the \$87,500 annual allotment authorized in the act and appropriated for. The remaining 87 are matching fund projects: 16 in fiscal 1965 and 71 in the 1966 fiscal year.

We have placed a great deal of emphasis this first year in more effective coordination of research and elimination of duplication that might be wasteful or unnecessary or undesirable.

The first publication we arranged for was a catalog of federally supported water resources research projects. You may recall that first volume listed the 1,545 Federal water resources research projects that are currently in operation.

Then we put out a second part of volume 1 covering all nonfederally supported water resources research projects. That covered 501 projects. So that there was a total of over 2,000 projects covered.

The CHAIRMAN. Dr. Renne, we have not been furnished with that catalog, have we?

Dr. RENNE. Yes, sir.

The CHAIRMAN. As a part of this hearing?

Dr. RENNE. Yes. I brought up copies and I think you have had them distributed to you.

The CHAIRMAN. Wherein you set forth the 1,545 and the 500 and you enumerate them and catalog them?

Dr. RENNE. Yes.

The CHAIRMAN. Do we have that, Mr. McFarland?

Mr. MCFARLAND. Yes.

The CHAIRMAN. Are they in the files?

Mr. MCFARLAND. Yes. We have copies.

Dr. RENNE. These have gone to every director and every project leader and every investigator of every project we have. We feel this has been an important factor in enabling them to see the kind of re-

search that is already underway and if they are working on a similar project or on a related project they can correspond or get in touch with the principal project leader and develop, I think, more effective research on their own part. Also, they can find areas that are not being covered. We feel it has been very helpful. The comments we have received have been very favorable on these types of catalogs which bring up to date current research that is being undertaken.

Then we have prepared and there will soon be published a comprehensive set of key words in water resources research for indexing. Every project investigator, when he submits a project to us, submits a one-page summary on Science Information Exchange forms, not only indicating the title and nature of the research but enough about the procedure so one can find the approach that is being used to achieve the objectives desired, and then four or five key words that would be useful in cross-reference and indexing and retrieval of information and bibliographic research, and would be helpful in the elimination of duplication. This has been very helpful to us.

These summaries go to the Science Information Exchange and it checks to see if there is a similar project already operating or, if not, this report is made back to us.

When the project is finally approved any changes that may have been made in consultation with the project investigators and the director of the center involved are included in the amended form so that the record which is in the Science Information Exchange of the Smithsonian Institution is as up to date as we can make it at all times.

We have also had prepared for us by leaders in their field what might be called the state-of-knowledge reports in their field of research to enable us to see a little better the scope of the field and the areas which are not now being researched thoroughly.

We have had prepared for us comprehensive bibliographies that will be coming off the press in the near future and will be made available, not only to this committee but to all research centers interested in this field.

On February 1 the Secretary of the Interior, Stewart Udall, set up a Water Resources Scientific Information Center for the Department to coordinate the information for retrieval and indexing and exchange of information for all agencies in the Department. We feel this is a very important step forward. Our office was asked by the Secretary to manage this information center and we are now proceeding with that.

I think I indicated last Monday, Mr. Chairman, that we have a good start, we feel, but I indicated at that time that we did not feel we were tapping all the potential resources for water research in the country. With only 26 noncenter universities participating out of some 1,850 in the country, there are other universities with real competence that are not now in the program.

We have received, since I testified on Monday, 2 more projects under title II, so instead of the 68 I mentioned on Monday there are now 70 and the funds requested by those who submitted the 70 projects total almost \$4.5 million. They deal to a large extent with ideas and procedures and objectives that are not included in our present program under title I.

Title I, as you know, has in addition to the on-going allotment for the research centers an amount for matching fund grants also to the centers. So our program thus far has been strictly through the State water resources research centers and no projects can be considered for action now unless they come to us through the center university.

Under title II Federal, State, and local agencies and nonacademic, nonprofit agencies can submit proposals directly to us for consideration. We have, as I say, some 68, now 70, proposals under title II even though no funds are available, and 41 of these proposals cover ideas or procedures which are not now in our present program under title I. They include instrumentation, mathematical modeling, systems analysis, urban water problems, and these are areas in which certain types of research organizations, through contract work in past years, have developed a great deal of competence. In general I think these projects would average larger. Our present projects average about \$12,000 each of Federal money which, in the case of the matching projects, would mean they run around \$25,000, which is a relatively small project.

I think, Mr. Chairman, that summarizes some of the things which we discussed Monday and I will be very glad to answer questions which will open up areas I may not have covered.

The CHAIRMAN. Dr. Renne, I think you have made a very fine presentation of the work that has been done and what you have in mind so far as the future is concerned. I am sure the members of the committee who have heard you appreciate your leadership and your militancy in carrying out the work that has been assigned to you. The questions that are asked, in my opinion, those that have been asked heretofore and those that will be asked today, are not intended as criticism but we will be trying to make the record. This is our responsibility as we consider an enlarged program.

May I say as a kind of side comment, after listening to your report and also having read the report and recommendations of the panel which reviewed the first year's activities under the 1964 act, I am wondering how we ever got along before the 1964 act was passed.

I listened to your short statement this morning and your reference to the fact there are many more universities—we were given the number earlier and it seems to me it was 1,100 or 1,300 universities that could contribute that have not had an opportunity to contribute under the present law. I wonder if your next step would be to recommend to this committee and the Congress that world universities also be brought into this program. In other words, I do not know where you intend to stop. I think Congress is interested in enlarging the scope of your responsibility, but I think we are also interested in what might be the ultimate. I was somewhat scared by previous testimony that every time there is research on one problem four or five new research opportunities present themselves. This is only a comment that I am making. You need not try to answer it.

In your letter of January 21 to the Speaker of the House submitting the 1965 Annual Report on the Water Resources Research Act of 1964 it was indicated the Department would proceed with strengthening the Water Resources Research Information Center. Would you describe what you have in mind and how it relates to the work being

done by the Science Information Exchange at the Smithsonian Institution?

Dr. RENNE. Mr. Chairman, the President, as you know, designated the Office of Science and Technology as the center for the coordination of water resources research work. There is a water resources research committee in the Office of Science and Technology made up of representatives of all the major departments of Government that deal with water resources and water resources research. There are eight, I think, and there are representatives on the committee from additional departments that are indirectly concerned. Mr. Eaton, the Associate Director of the Office of Water Resources Research, represents the Department of the Interior on that Committee and he is also chairman of the Water Resources Committee of the Department of the Interior, so we have a good means of helping in coordination.

The Science Information Exchange of the Smithsonian Institution has been designated as the information center for cataloging and indexing and recording ongoing research, and we have contracted with the Science Information Exchange on the preparation of these catalogs. We have contracted with the Science Information Exchange on the preparation of this comprehensive set of key words for indexing and information retrieval, and we keep in very close touch with them on the research projects so we have a record of what is being done in other areas and they have a record of our work, so that they have a rather complete record of our current water resources research efforts. We feel this is very important.

The CHAIRMAN. I can understand this. I can understand how your Office and the Office of Science and Technology should have this information also. What I want to know is how do you keep from duplicating each other's efforts in this respect?

Dr. RENNE. You mean the Department of the Interior with other agencies or within the Department of the Interior?

The CHAIRMAN. With the President's Committee that he has set up to act as his adviser, as I understand it. How do you keep from duplicating each other's efforts in order to keep your records straight?

Dr. RENNE. We use the reports and the services of that office in terms of the areas that are in what we call top priority or highest rank of need for study and research. We keep in very close touch with them. Their 10-year program has been very helpful to us. I think I mentioned that four-fifths of our program falls in the five top priority categories which they have indicated are most relevant. Dean Peterson, who testified, I believe, on Tuesday, works in the Office of Science and Technology and we work very closely with him. He was a former Director of the center at Utah State so he has a good idea of our program from the beginning and while he has been in this new position only a short time he has been very helpful in working with us.

The CHAIRMAN. I can understand that, but as I understand it in your Office you keep a catalog in accordance with the President's memorandum of October 24, 1964:

Public Law 88-379 also states that there shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources.

The Science Information Exchange has been making good progress in cataloging such research and shall be the general-purpose facility for such cataloging.

Dr. RENNE. Our catalogs are simply the result of coordination with the Science Information Exchange. We do not do the work.

The CHAIRMAN. The cataloging is being done as the law provides and as the President's directive sets up the machinery?

Dr. RENNE. Yes, and we pay them only the additional work involved for preparing these catalogs for us.

The CHAIRMAN. At our last meeting we went to some extent to find out how many people you had working for you. As I recall, it came out about 20½. It is hard for me to understand that half person, but that is all right.

Do I understand this office of Science Information Exchange is financed out of appropriations which are provided for the Office of Water Resources Research?

Dr. RENNE. Only the work which they do for us specifically on these special catalogs I mentioned.

The CHAIRMAN. Do you know of any appropriations coming from Defense, Agriculture, Commerce, HEW, Atomic Energy, National Science Foundation, Smithsonian Institution, Tennessee Valley Authority, or the Bureau of the Budget in order to help in the expenses of cataloging in the matters of research in water resources that they are doing?

Dr. RENNE. That the Science Information Exchange is doing?

The CHAIRMAN. No, that the other departments are doing that are centered in the office of Science Information Exchange?

Mr. EATON. Mr. Chairman, with respect to water resources work, not considering the space sciences or medical sciences, with respect to water resources the Science Information Exchange in the first year of its operation, fiscal year 1965, was funded from appropriations to the National Science Foundation. It got started by an NSF grant to the Smithsonian Institution to set up this water cataloging operation. It is my understanding that subsequent to fiscal year 1965 the funding of this water cataloging operation is entirely from appropriations to the Smithsonian Institution except, as Dr. Renne has pointed out, for those special additional pieces of work which they do for us at our request in the preparation of material for printed catalogs and other dissemination.

The CHAIRMAN. Under the President's directive this office of Science Information Exchange is supposed to perform like services for these other departments.

Dr. RENNE. They charge us nothing for their regular employees. It is the additional cost of printing and bringing together of certain types of water resources research which we have requested for our purposes that we pay them for.

Mr. EATON. The Science Information Exchange, in the water resources field, services all the Federal agencies and also non-Federal scientists. For example, they not only respond to our inquiries but those of HEW, the Department of Commerce, the Corps of Engineers, university people, and so on. So if you inquire of them you get that service without charge.

The CHAIRMAN. I want my colleagues who are here this morning to feel free to ask the acting chairman to yield whenever they have any questions.

Mr. HALEY. Will the chairman yield?

The CHAIRMAN. Yes.

Mr. HALEY. It is not quite clear in my mind. When these reports are filed, who could see them? Are they available, for instance, to a private enterprise corporation who may be doing water research projects, and is there any attempt on the part of the Government to more or less cooperate, you might say, with them? In my State, for instance, there are phosphate companies doing a lot of research in water.

Dr. RENNE. These publications you are speaking of now?

Mr. HALEY. Yes; these reports that come in. It may be some of your research here, the big phosphate companies may be doing the same thing and there would be overlapping.

Dr. RENNE. Of course the cataloging is only as complete as the reporting done to the Science Information Exchange by those doing the research. In the case of federally supported I think it is more complete than in the case of the nonfederally supported, but the Science Information Exchange gets this information directly and it is available when we prepare these catalogs. They are available both through us and through the Government Printing Office. We have a limited supply and when that is exhausted the Government Printing Office is the only available source left, but they are available. We published about 5,000 of each of those two.

The CHAIRMAN. I notice the report of the panel which reviewed your program recommended that you identify the kind of research you sponsor, and that in view of the limited funds available they should be used to the best advantage in solving our most serious problems in this field of water resources research.

How do you propose to implement this recommendation?

Dr. RENNE. Of course with these 47 problem areas that have been mentioned by the President—you are talking now about quality aspects of water; you are not limiting it to one field?

The CHAIRMAN. I am not limiting it to one field. I am limiting it to the most important problems that present themselves at the present time.

Dr. RENNE. There has been a great deal of work done in categorizing the problem areas in which research is most needed. There are nine major categories with subdivisions to those categories.

Then there are attempts made by the Office of Science and Technology to designate the areas of greatest importance. We have those areas. We also consult with others in the general research field and we try to encourage, through our communications and our conferences and our meetings with our directors and with project leaders of projects that we have in the program—we try to encourage them to emphasize those fields which we consider most important..

In the matching fund projects which we have, of course, we have a necessarily competitive operation so that we have to weigh all projects that are submitted and try to evaluate them in terms of their relevancy to what are the most important projects.

In the allotment program projects there is a reflection of the problems that are most acute in the particular State areas.

The CHAIRMAN. You take the States' own evaluation of their problems so far as their importance in the overall program, or do you further evaluate them? I have gone over this list of contracts that have

been entered into and that are proposed, and to my lay mind I can see some that do not appear to me to have this current importance that seems to be the desire of the Office set up by the President.

Dr. RENNE. Each State research center, Mr. Chairman, has been encouraged to not only set up—

The CHAIRMAN. You mean each State institute?

Dr. RENNE. Each institute center, these 51—and I might say we do not contemplate any more than that unless the Congress insist they be established. We think one in each State makes a good focal center for the water resources research in that State.

The CHAIRMAN. What will be the relationship between the State centers and the evaluation process and the administering process if you implement title II?

Dr. RENNE. We feel there will be quite a few projects that will be submitted by universities that are associated now or will be associated with the centers or the institutes. But, of course, there will be a great many that will not be associated. Those that are not associated and the projects that come directly to us will be evaluated by us, but at the same time I think, in terms of the elimination of duplication, the project center in the State should be informed of a project in another State institute.

The CHAIRMAN. That would be within your power, would it not?

Dr. RENNE. Yes; and I think it would be highly desirable.

There is, of course, considerable variation in the States in the evaluation process of the institute. The ideal, we feel, is where there is an executive board or committee of the institute that has representation from all the major disciplines of the institution—such as agriculture, engineering, the basic sciences, law, and that kind of thing—so that they do get a meeting of minds of the judgments and needs of the different areas.

Then if they are operating effectively they would have to have membership on an advisory board, not a large one, perhaps 15 members or so, as in the case of North Carolina, members representing not only the institution where the center is located, which is Raleigh, but also representatives from Chapel Hill, where the university is located, and in this case they also have representatives from Duke University, because they are a sort of a triangle, not very far apart, and this makes a very helpful advisory board. Some refer to it as a technical advisory board.

Then the third—

The CHAIRMAN. Before you go to the third, these boards you are talking about would not be financed from this water resources research money? It would be at their own expense?

Dr. RENNE. That is correct.

Mr. RONCALIO. Will the gentleman yield?

There are people in my office from Wyoming and I shall have to leave, but I have a few questions. Will the chairman yield to me for those questions?

The CHAIRMAN. After Dr. Renne has completed his statement.

Dr. RENNE. The third committee or council is statewide which has representation from the major Federal and State agencies that are concerned with water resources problems along with some key citizens who are knowledgeable in this field. This council, we feel, can

be very helpful in pointing out areas of greatest need, areas that are not being undertaken, as well as steer them away from areas where it appears there is sufficient work now being done.

Where the centers or institutes have this kind of arrangement and it goes through this process in evaluation, when the project comes to us with a statement from the director pointing out why this project has been approved and it is relevant to important problems, then we feel that we have got a good basis in our evaluation to feel that a considerable amount of effort has been done before which from the standpoint of that area of our Nation the best judgment has been applied to its appraisal.

I wouldn't say, Mr. Chairman, that we don't go on from there. We do, of course. We have our own evaluation procedures.

The CHAIRMAN. My only reaction to that is that we are not going to be difficult at this hearing on what is set forth in your report as far as different contracts are concerned that you have engaged in, that you have authorized, and those before us at the present time. I think that if some of these same kinds of contracts come to us in the next Congress, we will more than likely be a little more critical because, to me at least, again as a layman, it seems to me that we have accepted some contracts that just don't have this importance of immediate consideration I think all of us want.

Now I yield to my colleague.

Mr. RONCALIO. Thank you, Mr. Chairman.

First let me say that I am deeply impressed and respectful of the dedication and professional ability that you bring to your work. I am grateful to you for it.

Secondly, in the hope something might come out of my questions, my statements with you this morning, Dr. Renne, this law as I understand it approves your making a contract with a Mexican national or Canadian school because it would be authorized. The chairman's statement this morning raised a thought in my mind. That is, on natural resources and water in our hemisphere, we are one and the same with Mexico and Canada.

At the turn of the century, in an old Attorney General's opinion we maintained a right to divert the Rio Grande. We have proved with Canada that is not our policy now. We have been a good neighbor on the St. Lawrence, and on the Columbia.

Do you think this program could be helpful to the purposes it wants to serve if we could enlarge its scope through the universities all around the Great Lakes and to the universities of Mexico and Canada, also?

Dr. RENNE. Yes, I feel that with the immensity of the problem that greater effort is going to be necessary if we are going to have satisfactory solutions.

Mr. RONCALIO. Do you feel that this Congress perhaps ought to enlarge the scope of the work given to the Public Land Law Review Commission and say in addition to public lands at least study public waters and see what you come up with as guidelines for the continent in the generations to come?

The CHAIRMAN. If my colleague will yield, you are on your own on that one. We have all that we can do on public lands.

Mr. RONCALIO. I am aware of that, Mr. Chairman. I know that you have got more than enough work to do. My thought is quite serious here. We are interpreted now in Canada as being grabby and desirous of tremendous waters. As you know, there is water there. In order to prove to Canada our good faith, the first thing we ought to do is share with Canada the benefit of our research on water preservation and pollution abatement. Our relations with them can be improved.

Dr. RENNE. Our research work would, I think, be important in the ultimate answers to some of these questions but the questions that you are raising wouldn't directly fall in my area.

Mr. RONCALIO. I appreciate that.

The CHAIRMAN. If my colleague would yield?

Mr. RONCALIO. Gladly.

The CHAIRMAN. There is nothing to keep the Office of Water Resources Research from taking advantage of any material that may be available in other countries as far as that is concerned. But, for the United States of America to finance any operations in the other countries at this time, I think, is much further than anything we had expected to be authorized in this program.

Mr. RONCALIO. I was probing, Mr. Chairman, and inquiring into the future.

Dr. RENNE. Along that line, Mr. Chairman. A meeting is scheduled in Vermont on March 24 of the New England States and the neighboring Provinces of Canada. They will be listening in. They will undoubtedly have ideas that will be contributed but, of course, we have no plans to go across the border.

The CHAIRMAN. This is what interests the gentleman from Wyoming. Before coming to Congress, he was a member of the International Joint Commission. I can see what he is after. I think this is all right. I think that we should accept our responsibility in connection with the problems of the Great Lakes area.

Mr. RONCALIO. I am grateful to you, Mr. Chairman, for yielding. I am grateful to you, Doctor. I know as the chairman suggested there is nothing to prohibit these other universities from getting your reports also on your research in the public domain.

Dr. RENNE. That is right.

Mr. RONCALIO. I hope some good does come of this. This is a human resource and the best thing we can do is to share with Canada and Mexico the results of our research, which you are now making possible.

Thank you very much. I do have to return, Mr. Chairman.

The CHAIRMAN. Dr. Renne, why have you accepted applications for research projects under title II in view of the President's statement he would not request funds to implement this title?

Dr. RENNE. I didn't quite get the first part.

The CHAIRMAN. Why has the Office of Water Resources Research accepted already applications for research projects under title II in view of the President's statement that he would not request funds to implement the title?

Dr. RENNE. I think my answer turns on the use of your word "accept." We have a lot of correspondence, Mr. Chairman, with many, many different agencies and individuals. Some of them have specific proposals that they want us to know about, but we have not solicited

any. We have not given any encouragement to anyone that we would have funds to do any research but they say they would like for us to know about their interest and about their competence.

Many of the proposals are not in any such shape that they could be considered as negotiable for a contract or any kind of a grant, but it is simply indicative of the interest in the area and some of the types of problems that this particular agency, or this agency, or this corporation or this university feels it would be competent to undertake and that it is a significant problem.

The CHAIRMAN. You have not accepted them but you have permitted them to be on file in your office; is that correct?

Dr. RENNE. We have filed them because we feel it is like any other public record in terms of correspondence and information. Yes.

The CHAIRMAN. I am interested in the fact, Doctor, that with the one exception water resources research institutes have been established in the land-grant institutions in the various States. In your negotiations with respect to the establishment of these institutes was it made completely clear that the States have the authority to designate any institution in the State as the location of the water resources research center?

Was it made completely clear that even though there was to be only one institute there was authority in the legislation for an arrangement whereby several universities and colleges could participate in the research work?

Dr. RENNE. First of all, Mr. Chairman, we did point that out in this qualifying period in which 43 of the States qualified by the first target date of December 6 for funding under the limited funds available in the first supplemental appropriation. In every case we required clear, definite statements as to where the water resources research center was to be located.

If there was more than one land-grant institution, then we have in the file a statement from the Governor of that State indicating which of the two. If it was to be at other than the land-grant university, of course, then it had to be by a specific act of the legislature.

In the case of Georgia, that action was taken and the Georgia Institute of Technology, Atlanta, by specific act of the legislature, is designated as the location of our institute in Georgia.

In every case we have encouraged, by every means we know how, to emphasize coordination within the State. We like to think of the Water Resources Research Institute in the State as the focal point or clearinghouse for all water resources research activity in that State. I know this is rather a broad objective but we think in the long run this is very important. It does not mean that that particular university can itself undertake all of the essential research but it certainly ought to be a means through which other institutions and agencies in the State, as well as our office in Washington, can keep abreast of what is being done and, of course, the institute itself will have an important part in the program.

The CHAIRMAN. Can you advise the committee your idea of why Congress established these institutes in the first instance in the land-grant colleges?

Dr. RENNE. Of course, Mr. Chairman, I was otherwise engaged when much of the discussion was going on about this.

The CHAIRMAN. That is why I ask it. I want to know your thinking on the legislative history of this act.

Dr. RENNE. I was for many years chairman of the Water Resources Committee of the American Association of State Universities & Land Grant Colleges.

I am sure that the very marked success of our agricultural research program under the experiment station system was a factor in that emphasis. I know Mr. Eaton has been involved for a longer period of time and much more directly on this end of the line than I. Maybe he will want to comment about that. I am sure that the agricultural research record was a factor in emphasizing in title I the land-grant university.

The CHAIRMAN. Was there not also the thought in mind of certain Members of Congress that the Federal Government has no university as such? The closest thing to a Federal university that you can think of throughout all its history is the land-grant college idea. The 88th Congress was a little bit loath to set up anything that would approach any nearer national universities than the Federal land-grant colleges. If that is true, and that was in the minds of many of us—I think Mr. Eaton would agree that we spoke of this time and time again—if that is true, is there any chance that we will, by accepting title II, put ourselves into a position that we further the idea of a national university or a national collegiate program?

Dr. RENNE. I don't think so, Mr. Chairman.

The CHAIRMAN. All right. That is all I want.

Dr. Renne, apparently you have been able to get well-qualified people to head these water resource institutes for various States.

Are the salaries of these institute directors paid by the Federal Government?

Dr. RENNE. There is a considerable variation in the practices among the States—some of the States pay the full salary of the institute director from State funds or other than Federal funds. Some try to divide the portion of the director's salary, first of all on the portion of his time devoted to directing the institute or center, and many of them do share. They have part of their salary paid by the State and part by the Federal Government. There are no Federal employees as such.

The CHAIRMAN. These research institute directors cannot in any sense of the word be considered as Federal employees under civil service laws and regulations?

Dr. RENNE. No, sir.

The CHAIRMAN. From your office there has been no direction as to the grades that these directors may have as far as their States are concerned, or may have in relationship to the operation of the Federal Government employees?

Dr. RENNE. No. The university in the State makes the selection of the director and the director is responsible to the university administration and to the board of regents in that State. In no sense that I can see would they qualify for the characterization of Federal employees.

The CHAIRMAN. Doctor, at our last session we spoke about the number of personnel and how many more personnel would be required if we authorized title II. Are your personnel needs presently broken

down between professional and administrative personnel? If so, could you give us the number and ratio?

Dr. RENNE. At the present time we have seven professional staff members that are classified in the water scientist category. That includes myself, Mr. Eaton, the associate director, four senior water scientists, and one junior water scientist for a total of seven.

Then we have an executive director, executive officer, I should say. We have a grants and contracts officer and we have a statistician, or what do we call him now? I think statistician is still the word. No, program analyst, I guess he is called. So we have three supporting individuals, executive officer, grants and contracts officer, and a program analyst.

Then we have a statistical clerk. Then the rest are clerks and stenographers or secretaries. So we have 7 water scientists, 3 of the direct management supporting group, or a total of 10, which is exactly half of our present ceiling of 20.

The CHAIRMAN. Dr. Renne, do some of the research contracts for projects that you have at the present time involve saline water research?

Dr. RENNE. Mr. Chairman, we have one that is listed in that particular category of saline water conversion research.

The CHAIRMAN. Will this one and any additional ones in the future be coordinated with the Office of Saline Water?

Dr. RENNE. Yes, sir. When any project comes in that deals with an area of research that another agency is undertaking, or is authorized to carry out, we refer that project to that agency. In this particular case, this one project, it is a rather fundamental type of research which the Office of Saline Water suggested that we fund and they not fund. In other words, we clear first with the Office of Saline Water on projects that deal directly with desalination or closely related aspects. We do that in other project areas, too. We do have one project which the Office of Saline Water suggested that they thought would be better funded in our area.

The CHAIRMAN. You mentioned at the last meeting, and also in your opening statement today, the matter of matching funds. Have there been any difficulties encountered under the section 101 program of the act? Have you had any difficulties in securing matching fund requests?

Dr. RENNE. You are interested in the problem of the States getting the matching funds?

The CHAIRMAN. I am interested in whether or not you have had any difficulties in getting a contract entered into because the States have been unable to come up with the matching funds.

Dr. RENNE. Well, the fact that we have only 28 States that now have matching fund grants, and have received requests from only 36 all together, is indicative that some of the other States either do not have the matching funds, or do not have enough of the matching funds, or feel that they would rather spend their money in some other way.

In other words, we have not as yet had matching fund requests from all the States.

The CHAIRMAN. I have gone through this list and I have seen certain contracts that are primarily beneficial only to the States in-

volved. It would appear to me at least in those instances the States should at least be on a matching basis. What is your position if we make all of the funds that would be available under title II, if approved, subject to matching procedures from the various States?

Dr. RENNE. I think there would be certain types of projects, Mr. Chairman, that we would have to consider on their merits that might be very difficult for some submitting agencies to match 50-50. For example, on one very fine university when we said, "You have no project in the areas of economics, management of water resource problems," the answer came back that, "We have been talking with the departments that you mentioned but their men are all involved in other areas of research or have very heavy teaching loads and we just simply can't interest them."

The CHAIRMAN. I should think that local responsibility in these universities or local institutions should sooner or later bring home to them the necessity of local contributions to assist in what we are trying to do.

Dr. RENNE. Well, in checking our present program in every case there are sizable contributions by the States. There are sizable contributions even on the allotment program.

The CHAIRMAN. Why should the Federal Government be interested in a review of the Colorado water law?

Dr. RENNE. Well, I know that many of the States are now having very serious problems because they feel that there have been some serious problems, for example, in ground water.

The CHAIRMAN. I can understand that, but why is it necessary to go back and review all the Colorado water law in order to tell them what is necessary as far as a research program is concerned in ground water? Why is that the Federal Government's responsibility?

Dr. RENNE. Well, each State has a definite set of laws, as you know better than I. I think the fact that the legal arrangements within a State dealing with the water resources are peculiar to that State means that each of the State centers should have an up-to-date, clearly defined understanding of what the laws of that State contain relative to water.

In the case of Wisconsin, they feel that they are going to have to have an almost complete reappraisal of the laws which deal with water resources in that State because of extensive developments in the use of water for recreation, certain underground problems, certain shore problems along their lakes.

In talking with some of those men they feel that this is a very fertile area that has to be researched before they can proceed to be helpful in advising what kinds of solutions might be most applicable.

The CHAIRMAN. In a case like that, do you not think at least there should be matching procedures? You see, I do not know whether there is in the minds of some that we are going to have a general water law promulgated by the Federal Government or by the Nation, or whether we are going to permit these States to have a riparian theory, or those that have an appropriative theory, or a combination of all of these, whether it is in the minds of some that we are going to come in with a general law relating to water.

Is this a part of what is involved?

Dr. RENNE. I am not sure how far a Federal water law would cover the detailed applications in every State, Mr. Chairman.

The CHAIRMAN. I am telling you if you have anything like that in mind you better get it out of your mind because you will have a regular revolution. No question about that.

Dr. Renne, is the program envisioned by Senate bill 22 primarily for the benefit of "educational institutions, private foundations, or other institutions" so that they may become more efficient and effective in water research work, or is such a program absolutely needed in a well-coordinated Federal research program?

This is the \$64 question as far as making a case for this bill is concerned.

Dr. RENNE. I think the purpose of title II, Mr. Chairman, is to serve the public more effectively and not necessarily build up any particular universities or agencies. I am sure our office does not feel that our obligation is to try to strengthen the universities just to strengthen the universities. If, in the process of solving some of our water problems, the institution becomes stronger, well and good. I feel very strongly that at the present time we are not drawing on our full competence or anywhere near it. At the same time, I feel in many areas, our research problems are perhaps outdistancing us. I am not sure that we are gaining ground in some cases. Of course, we didn't get here in a day and these problems have accumulated.

There is a considerable backlog of work to be done. I think some of these noncenter universities, some of the nonacademic organizations, both nonprofit and profit, some individuals, we have had some individuals talk to us very imaginatively on their own.

The CHAIRMAN. This takes me to this observation. You can answer it as you would a question. We publicize these meetings. These meetings have been well publicized. Do you know that the only people who have appeared here at this hearing have been the people from the Federal Government interested in water research, the college administrators, and certain individuals of the panel which was appointed to study your report? We have had no laymen. We have had no water people as such unless they had some other responsibility.

This makes it rather difficult. It appears to be a university-oriented program.

Dr. RENNE. I think you have had the conservation agencies, Mr. Chairman.

The CHAIRMAN. Such as which?

Dr. RENNE. The Soil Conservation Association.

The CHAIRMAN. We also had a representative, did we not, who was on the advisory commission?

Dr. RENNE. I think that was quite incidental, though. You mean on the panel?

The CHAIRMAN. On the panel.

Dr. RENNE. I think that was incidental because the same individual testified in the Senate before we ever had a panel. So did the Izaak Walton people and those organizations that are from day to day very much concerned with it.

The CHAIRMAN. They were represented on the panel.

Dr. RENNE. It just happens they were. They were also involved, of course, in the discussions of the bill in its earlier stages going back 3 or 4 years. So I think being on the panel was in fact quite irrelevant to their interest in this program, which was earlier, and their testifying here during the week is a continuation of that same interest.

Also, I think that the same interest meant that they were probably in a better position to judge from their own viewpoints whether we had made good progress or not, because they had been interested and concerned.

The CHAIRMAN. We had no executive from any State showing his interest for the State or himself, either one.

Dr. RENNE. Well, the Council of State Governments was represented and of course the States usually look to the Council of State Governments to act as their liaison with the Federal hearings and Federal activities in Congress.

I think, Mr. Chairman, that some groups and some individuals by the very nature of their work are more directly concerned and better informed than a lot of laymen. There is a lot of interest according to our correspondence and also a considerable amount of confusion because things have come pretty fast in the way of water problems.

The CHAIRMAN. Of course, the program would not go to pot if we did not authorize title II at this time. You would still carry on. The question is whether you would carry on in as efficient and effective a manner if you were limited to title I.

Dr. RENNE. I hope that we have got title I going in the right direction but I do feel strongly that we are not doing a full job. Put it that way.

The CHAIRMAN. I do not think any of us are especially critical of the operation, thanks to you and those who are working with you. I find, as I go through the list, though, several contracts that have to do with small watershed studies. We have the Soil Conservation Service studying small watersheds. Why is it that the water resources research organization has to go in and assume some of the responsibility for this and other Federal activities?

Dr. RENNE. Along that very area that you have mentioned, watershed studies, we are now proposing to set up a small group to go thoroughly over this area because frankly we have some serious misgivings about it. Watershed studies have a very strong appeal because they study a small area very thoroughly with the idea of applying the results on that small area study to a larger area. Unless every factor in that small watershed area is evaluated properly then in transferring it to apply to a larger area, the error is magnified.

The CHAIRMAN. You get into competition with the responsibilities of the river basin water planning program?

Dr. RENNE. We have momentarily postponed any action on any watershed projects that come to us, until we can get an analysis and a report from this group that we are setting up, to thoroughly examine the watershed research area. We just don't feel that at this time we can go ahead until we know more from the best minds that we can get on a consulting basis.

By the way, that explains that half man you were talking about earlier. We use consultants to a considerable extent.

The CHAIRMAN. I have one final question now and I will turn it over to the rest of the members.

Doctor, you have talked about and I quote, "marshaling of the Nation's full research potential" and you say that we "are not now tapping anywhere near the total research and training competence of our universities."

Is your objective in this program as Director to put every qualified scientist and technician to work on water research or is it your objective to meet the specific research needs related to the Nation's water problems?

In your statement I get the impression that you are giving greater attention to the former objective and I want to be sure that our record shows your true feelings about this.

Dr. RENNE. No, I simply feel that there are problems that we are not now attacking as effectively as we could and should. I think there are in some universities and individuals, sometimes more than in one individual, who would be very competent and helpful in this area.

On research, in my mind, you have got to go where the brainpower is to get the most effective job done. I suppose a little interpretation of the total potential would mean to utilize every individual that had some latent possibilities to do water resources research. I am sure that that is not the way it will work out. I feel that first of all we ought to focus on the major and most significant problems that we face and then get the job done where we feel it can be done best.

There are some areas now where under our title I we are not getting very much work done.

The CHAIRMAN. Did I understand, Doctor, you are not only willing but you are anxious to appear before this committee annually to explain your program as fully as you can within the time limit and to lay yourself open to questions of those members of the committee who are interested in this program?

Dr. RENNE. I could say honestly, Mr. Chairman, I would be very much disappointed if I did not have that opportunity. It would help me a great deal and our staff to have this privilege.

The CHAIRMAN. Thank you very much.

The gentleman from Nevada.

Mr. BARING. Mr. Chairman, I regret I was late this morning but I had a meeting in my office. Possibly the questions that I will ask have been answered. I would like to put it this way: I have heard of the budget messages that we have received in the last several weeks, that the land-grant colleges were taking quite a whipping on the appropriations. What effect would that have on this particular program?

The CHAIRMAN. This subject has not been covered.

Dr. RENNE. Mr. Chairman, having been connected with a land-grant university a good many years, I know because in our travels and in our consultations and our discussion of projects with our research directors, they are most of them at land-grant universities. This is on their minds. What effect it will have on their ability to match funds I do not think is involved because on average, for the country as a whole, Mr. Baring, there are nearly \$4 of State moneys put into the agricultural research program for each \$1 of Federal. So I do not

see immediately that this problem would directly concern us, so therefore I really could not answer your question.

Mr. BARING. I have received several letters in the past week from the directors of the agricultural research programs. They were sick about the cuts they are going to have. They do not have the funds to carry on even the salaries. I am going to be a little more brutal than the chairman was. The chairman put a statement to you before. Dr. Renne, do you favor a Federal water law?

Dr. RENNE. Do I favor Federal water laws?

Mr. BARING. Yes.

Dr. RENNE. Well, it depends. That is a good question. I would favor the kind of legislation that would encourage the States and the Commonwealths—in our case Puerto Rico—to undertake programs which would help solve their most significant problems. But I would certainly hesitate to say that the Federal Government through legislation, by law, should do that first or take the primary role in doing that. I would hope it could be a cooperative partnership proposition.

The CHAIRMAN. If the gentleman would yield.

Mr. BARING. Yes, Mr. Chairman.

The CHAIRMAN. Do you favor a Federal law to administer the use of water within a State?

I think that is what is bothering the gentleman from Nevada.

Dr. RENNE. Well, I know that many of our problems are getting to have more national significance all the time. But I do not believe I would want to go quite that far yet.

Mr. BARING. That is all.

The CHAIRMAN. The gentleman from Oregon.

Mr. WYATT. As I understand it, Dr. Renne, the staff of your organization at the present time is 20?

Dr. RENNE. That is right. I did not get the last part.

Mr. WYATT. The size of your staff office now is around 20 at the present time?

Dr. RENNE. That is right. That is the ceiling, personnel of 20.

Mr. WYATT. Will that increase if this bill is passed?

Dr. RENNE. If title II is implemented it would add 3.2 according to our estimate. Three regular employees and two-tenths consultant man-years the first year. The second year the total that would be added from the 20 that we now have would be 5.2 and it would remain constant at the 5.2 for the 4 years following. We have estimated for 4 years following.

Mr. WYATT. Have you broken those people down as to administrative people and as to water scientists?

Dr. RENNE. Yes; we have that. The professional and supervisory would be the first year, two. The clerical, one, and the consultants, two-tenths.

Mr. WYATT. This is perhaps a little detailed and I am not certain of the bearing this has on this particular bill but what emphasis in a general way is given by your Office on first, the subject of conservation of water use; and secondly, upon the research and study of water reuse? Can you answer that in a general way to me here?

Dr. RENNE. We have a great many projects at the present time under this first full year of operation that deal with water conserva-

tion, that deal with trying to increase the availability and the use of water that comes to us through precipitation in various forms and before it gets back into the clouds. In other words, the hydrological water cycle. A great many problems deal with intercepting it somewhere along the line to make it last for a longer time, for a greater amount of the water to be available for use. I think as a matter of fact, that 135 projects out of our present number of 471 deal with some aspect of trying to get more effective use of the precipitation that falls.

On reuse, which I personally feel is a very important area, we do have a considerable number of projects in this field but not nearly as many as on the first group of projects because I think reuse is a newer area of research in most of the land grant institutions.

You remember now that they have for many years been dealing with plant-water-soil relationships, some aspects. They dealt with it or were interested in at least evaporation and transpiration, but reuse is a newer area to many of them. They are becoming increasingly interested and concerned. We do not have as many projects in that area yet as the first.

Did I answer your question?

Mr. WYATT. Yes. I was thinking in particular of the problems that we have read about in the newspaper, about New York City. Also, the failure to meter for personal use, the defective water mains which are legendary there and I am certain their problems are comparable throughout the country. I also think about one problem pointed out to me a few weeks ago. I was told how many toilets there were in the city of New York, and I cannot recite the number, but there are several million apparently. The amount of water that it took to flush each toilet, the average number of times that each toilet was flushed, and I was also told that there were in some places devices that were coming on the market that could be used to adapt toilets to require 50 percent of the amount of water that is now required. It does not take much imagination to figure out the terrific conservation of water use involved there.

I would not specifically pin you down to this one small area but would your research programs that you hope for eventually include things of that general nature, study of things of this general nature?

Dr. RENNE. Yes. I think I mentioned on Monday one of our projects in which a feedlot in one of our Western States, in this case North Dakota, where we have a project on the reuse of water through recycling on a fattening lot, feedlot for beef cattle to see just how much water can be saved. Because in certain areas of that State, water availability is limited and what problems arise come from an intolerance to brackish water. So they are setting up this experiment on a complete recycling, reusing very bit of water over and over. Of course, adding as it is necessary to add. I do not know how this will work out with biological problems that might arise.

It will be quite a different thing from recycling in a steel mill. Nevertheless, when that project first hit us, we looked at it very carefully. It seemed sort of maybe too far down the road in the future. At the same time, it deals with a problem that is very real. So we did fund it and they are now underway and in the research. It will take time to know what kind of results they have. I think we

will do more of the type of things you have been mentioning because it does provide a most satisfactory solution and rather inexpensive in a way. You do not have to transport the water again and in many cases not so far.

Of course, it will involve careful treatment and it will involve very careful plumbing arrangements, too. I think these are areas that need to be studied. There will be new ideas all the time and they will have to be tested.

MR. WYATT. Thank you, Doctor. I think that is all the questions I have. I am sorry that I was not able to be here on Monday. I consider this to be an excellent program, very exciting, and I appreciate the work that you and your staff are doing. I look forward to working with you in the future.

DR. RENNE. Thank you, Mr. Wyatt.

THE CHAIRMAN. Does the gentleman from Wyoming have any more questions?

MR. RONCALIO. No questions.

THE CHAIRMAN. The gentleman from Idaho.

MR. HANSEN. Mr. Chairman, I am gratified to be here and I apologize for not being here yesterday and earlier since I was out of town.

I am very interested in this proposition of water resources and research. I certainly commend you for the work and your presentation. It was very interesting to me and worth while.

DR. RENNE. Thank you, Mr. Hansen.

THE CHAIRMAN. Does any member of the staff have a question?

MR. MCFARLAND. Mr. Chairman.

Dr. Renne, I know that you are aware of the committee's concern for this very broad language in the bill. I know that the Department is aware of this concern for this language which in effect would give the Secretary authority to do just about anything in the way of research so long as it related to the Department's work.

Has there been any consideration given by your office, or by the Department of the Interior, to redrafting this bill in more detail to set out some guidance in its administration? In other words, you would undoubtedly develop regulations to implement this legislation if it were enacted. Could not those regulations be in a way used as legislative language so as to overcome this concern of the members?

DR. RENNE. Of course, when you say that it is within the mission of the Department of Interior, it does cover a broad area because Interior is the natural resources conservation agency, I suppose, if we have one. But the rules and regulations which have been established, I think, Mr. McFarland, spell out fairly carefully rather exacting procedures that would prevent—

THE CHAIRMAN. You see, Dr. Renne, we do not have any control over those rules and regulations.

DR. RENNE. You would each year, would you not, when I come up?

THE CHAIRMAN. I doubt it very much. I doubt it very much because there are so many of them. This is one of the reasons for the Public Land Law Review Commission, the fact that Congress did not do its duty, abdicated its responsibility, and the administering departments had to go ahead and accept the responsibility.

Now he have nobody knows how many rules and regulations. What Mr. McFarland is calling to your attention is very important to us in the legislative department. We do not criticize the departments as we talk about this because we know that if we do not do the job, they have to.

We know also, as we approve legislation, that there are many things we cannot have in mind because of the future problems to take care of. Surely after a year of operation you could have some formula to answer this criticism. As the late Clair Engle would say, "We don't need a waterway to put the *Queen Mary* through to take care of a little destroyer."

When we give this power to the executive then the executive just runs away with it. This would be fine if the executive had to be responsible for the purse strings. Under the Constitution, the executive is not responsible for the purse strings. That is a congressional responsibility.

Dr. RENNE. Mr. Chairman and Mr. McFarland, we do already have certain guidelines which govern our activities. For example, when you in the act said in effect the quantity or quality of water, this has helped us more times than you would realize in distinguishing between the projects that we felt we should support and those that we should not. It has given a very good basis in rejecting.

Another area is the oceanography field. We stopped with the estuaries. We have had proposals that take us way out in the ocean. We do not feel this is in any sense our area of performance. I think these develop as you administer a program, and frankly, I would think we would do a more effective job if we, along with the universities and other agencies that might be involved, have specific guidelines.

We have indicated those in the annual report appendix that has already been set up, to guide those who submit projects. It saves time on their part. We continually watch the areas that might be peripheral or very questionable, and put those in the lowest possible category. Our staff has fairly broad coverage of disciplines and we have regular staff meetings and discuss these with the group because we are small. When we get all of them together they as a rule will come to a pretty sound conclusion about whether this is really a relevant and significant research proposal.

Mr. McFARLAND. Who under this new language would make this kind of a decision? You have a proposal before you. Who would make the decision as to whether you would require matching funds or whether this would be an outright grant? How would this be done?

Dr. RENNE. Well, I think it would depend a great deal upon the kind of research proposed and the kind of agency that was proposing it.

Mr. McFARLAND. Would not your regulations have covered that matter so that it could be done under the regulations and not by the judgment of some—

Dr. RENNE. That is right. You just have to do this.

Mr. McFARLAND. My question is simply, Why cannot the language in this bill be expanded to incorporate some of these regulations so that there would be guidelines from the Congress and not guidelines from the regulations?

Dr. RENNE. I suppose it is the fact that they would perhaps have to be so detailed that then you would be fearful of being too rigid. I would think that the person carrying out the programs and reporting regularly to the congressional committees in turn through discussions like this, you would be able to say, "Well now, I think you are getting pretty far afield here."

I think we have some hunches about that before it hits but you would be coming at it from a different angle. I would think this would be a more adaptable way of solving it than perhaps getting it too rigid in an act. Our rules and regulations are pretty rigid. Of course, they can be interpreted differently, I suppose, by some people. But the policies and guidelines we set up to send out to those who would apply, they are pretty carefully spelled out.

Mr. McFARLAND. For instance, under this language the Secretary could say, "Well, there is a research project I want the Geological Survey to do or a project I want the Bureau of Reclamation to do. I want to fund it under this act," and he could under this language.

He could recommend that the entire budget for 1 year be used within his own department under this language. That is the point. There is nothing that gives really any guidance as to how the money is to be used.

Dr. RENNE. We are accountable to the Congress and I am afraid when it came up we would be in trouble if that occurred. I think there would be some protestations before that developed.

Mr. McFARLAND. Mr. Chairman, I just raise this point to point out to Dr. Renne the concern of many members. We had hoped that after a year that perhaps the Department would, after studying this, be able to give us language in more detail that would provide some restrictions on the research operations and some guidance in the administration of the program—language that the Congress could accept and act on.

I just wanted to raise this question and again bring it to your attention.

The CHAIRMAN. If I were Secretary of the Interior I certainly would like to have some more definite guidelines because this leaves him open to a great deal of pressure, if it is left as wide open as presently in this bill. If I may say so, the Secretary of Interior shouldn't have to make decisions for the Research Office of Water Resources. Nevertheless the Office of Water Resources Research is not going to go contrary to any desire or wish expressed directly or implied by the Secretary. So if I were Secretary I would want more definite guidelines.

In the present administration everything may be well and good, but in some administrations it might be difficult.

You have our thinking. Do you have any suggestions? If you have any later on, send them up to us.

Dr. RENNE. The only thing I can see, Mr. Chairman, is a very close working relationship all along with your staff and with our office. I cannot see any better way than that to allow enough adaptability and at the same time have the proper controls. The most we would be out would be a matter of months or a year in getting off the line, if we got off it. I, certainly Mr. Eaton and others of our staff, would

come up here at any time that you say and we would be delighted to have this opportunity.

The CHAIRMAN. May I say this, Mr. Director: You have been a very responsive witness, a very cooperative witness. The members of the committee appreciate it very much that you and Mr. Eaton have come up here.

You will more than likely hear from us in the future as far as that is concerned. We are quite limited as far as staff is concerned; but you have more professional staff than we have. We have responsibility not only for oversight of your operations but the oversight over the operations of 20 other agencies. So we can only go so far.

In the interests of good government, we want to see a program that is effective, that is within bounds, that inures to the benefit of the taxpayers generally as long as it is Federal money being spent.

Any other questions?

If not, our continuing thanks.

The committee stands adjourned.

(Whereupon, at 11:44 a.m., the subcommittee adjourned.)

WATER RESOURCES RESEARCH

TUESDAY, FEBRUARY 15, 1966

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:50 a.m., in room 1324, Longworth House Office Building, Hon. Wayne N. Aspinall (chairman of the full committee) presiding.

The CHAIRMAN. The Subcommittee on Irrigation and Reclamation will now be in session for the further consideration of H.R. 3606 and similar bills.

It is necessary today that Dr. Renne be in another locality. People find it most difficult in government these days to be in two different places, especially when they are 2,000 miles apart, at the same time, so Dr. Renne was excused. He was excused with the approval of the acting chairman of the subcommittee last evening.

The first witness this morning will be Dr. Dean Peterson, technical assistant, Office of Science and Technology.

Dr. Peterson, we are glad to have you before the committee and we will be glad to listen to your presentation, and we will be glad to have you accompanied by whomsoever you wish to bring to the witness table with you.

As I understand it, the presentation here this morning has been approved by Dr. Hornig with whom you work; is that right?

Dr. PETERSON. Yes, sir. Mr. Chairman, honorable members of the committee, I would like to introduce Dr. Charles Kidd, who is secretary of the Federal Council on Science and Technology, who is with me here this morning.

I would like to also say that if I may, Mr. Chairman, I would like to make some interjections to my remarks.

The CHAIRMAN. That will be permissible.

As I understand it, you are going to read your statement and you will make interjections as you go along; is that right?

Dr. PETERSON. Yes, sir; if I may.

The CHAIRMAN. All right.

**STATEMENT OF DR. DEAN F. PETERSON, TECHNICAL ASSISTANT TO
DR. HORNIG IN THE OFFICE OF SCIENCE AND TECHNOLOGY;
ACCOMPANIED BY DR. CHARLES KIDD, SECRETARY OF THE FED-
ERAL COUNCIL ON SCIENCE AND TECHNOLOGY**

Dr. PETERSON. My name is Dean F. Peterson. I am a technical assistant to Dr. Hornig in the Office of Science and Technology. I am on leave as dean of engineering at Utah State University and as chairman of the water resources center at that institution. I might interject at this point that I am chairman of the Committee on Water Resources of the Federal Council for Science and Technology.

Dr. Hornig regrets that meetings of the President's Science Advisory Committee this morning prevent him from appearing here personally.

The critical questions in our view, about the bill under discussion are: Is there a need for additional research effort? Are there qualified people with good ideas available and interested? What are the mechanisms and criteria on which the proposals to do research are to be judged? Is there a need for research grants and contracts to supplement the centers established under Public Law 88-379?

With regard to need, the Committee on Water Resources Research of the Federal Council for Science and Technology has been working for the past 8 to 10 months on a long-range program for Federal water resources research. A report of this effort is nearing completion. The members of the Committee, representing eight departments or independent agencies, have studied various categories of research in considerable depth. The Committee has reached quite unanimous agreement regarding scope and size of effort needed as well as priorities over the next decade. Research problems in each category will be discussed in considerable detail by the report. This report can be used both inside and outside the Government as a basis for programming water resources research. As the Committee has reached agreement on areas of needed research, this information has been carried back informally to the departments and agencies concerned with the result that the studies made by the Committee have already influenced the Federal program of research. The informal findings were taken into account in allocation of matching grant funds under title I of the Water Resources Research Act of 1964.

At this point, Mr. Chairman, I would like to interject another statement. I would like to state that the United States, in terms of its water resource utilization and problem, is a very different nation than it was even 20 years ago or 30 years ago. The gross national product, I am told, has been increased from less than \$100 billion before World War II to nearly \$700 billion. This is supported by the industrial activities of a great many people. In a way the demand on water resources is related to our industrial effort because it takes water to produce steel, to do everything that we do industrially, and then there is the problem of taking the industrial waste away, which imposes a load on our resource. So this is one of the reasons why the demand on resource has changed so rapidly under our very noses.

Mr. ROGERS. Doctor, would you permit me to ask you a question at that point?

Dr. PETERSON. Yes, sir.

Mr. ROGERS. Has this created a water shortage in the United States?

Dr. PETERSON. Let me try to answer it this way, sir: Let me say yes, sometimes this turns up in terms of polluting the resource so that it makes it unusable. The water is still there, but it isn't available any more because of its pollution.

In agriculture, the increased use of fertilizer, which has enabled us to be the greatest agricultural production nation in the world by far, has had its repercussions on the resource. The use of insect-control chemicals—all of these things have in my view completely changed the demand on this resource. The fact that we have a great deal of readily available transportation has the result that people want to enter onto our watersheds in much larger numbers than ever before and this has placed a different kind of a demand on our watersheds and our streams. So I think all of these things are in a broad way changing or have changed very radically the demands on the resource.

Mr. ROGERS. Doctor, if you will permit me to go just one step further, what you are saying is that there is a shortage of usable water?

Dr. PETERSON. Yes, sir.

Mr. ROGERS. And of course when you get into the distribution situation, what might be an area of water surplus today could become an area of water deficit tomorrow, because of the movement of people into that area.

Dr. PETERSON. Yes, sir. The production of thermal electric power, for example, places a rather startling heat load on our streams. A 5,000-megawatt plant on a watershed may materially raise the temperature of the river.

With regard to the opportunity for research, I have made a point of informing myself firsthand and in some detail of the scope and nature of unsolicited preproposals for title II funding already received by the Office of Water Resources Research and of the grant reviewing processes and evaluation criteria used by that Office. The Office has received 68 such preliminary proposals involving requests totaling \$4,250,000. No proposals for title II funds from any of the existing water research institutes are included. These proposals I saw are not finished proposals but are in various stages of maturity. My conclusion from examining a random sample of about 20 of these is that, in a large majority of cases, the research suggested is important, the institutions and investigators are well qualified and the preliminary plan for conducting the research are promising.

I have regularly been called upon over the last decade to review proposals, primarily in various areas of engineering, received by other granting agencies and I judge the water research preproposals I saw to have at least equal or better promise on the average compared to these. A number are very good, backed by well-qualified investigators.

Examination of the screening and evaluation procedure of the Office of Water Resources Research, leads me to conclude that careful consideration has been given to this matter. The procedure used to date is outlined in appendix VII of the 1965 report of that Office and involves two reviews by staff specialists and review by another qualified Federal agency and/or by specialists outside of the Federal Government. The Office has utilized the services of a distinguished

panel of scientific and public leaders in the water resources field to examine its operations and to make recommendations on objectives and criteria. I judge the report of this panel as very good. It is published in the Office's 1965 annual report. The Office has also called on distinguished specialists to provide guidelines in four particularly difficult areas. These reports have not all been received. I have read one, however, and believe it is most thoughtful and useful.

One point, which seems to me to be important, is the matter of critical size. Some problems remain intractable until some threshold of minimum effort in terms of apparatus and time is invested. Some of the more attractive preproposals I saw were in the range of \$100,000 to \$300,000. Financing under title I of the present act for projects at this level would be very difficult.

The present program has been successful in getting the effort started on a broad front, which is important. It is essential also that some problem be tackled in greater depth. Title II as modified by S. 22 would permit this. It will also make available talent regardless of where it occurs, whether individual, private, university, or within the Federal Government.

In its efforts the Office of Water Resources Research should seek the best qualified individuals and organizations available. The existing 51 institutes are excluded from participating in title II projects under present legislation. It seems to me that these particularly should not be excluded, because many of the most capable investigators and laboratory facilities are found within these institutes. One of the benefits of the Water Resources Research Act of 1964 is to bring about the development of capable water research institutions. It seems somewhat illogical, having made the investment in these institutes, to exclude them from the kind of research which might be needed or could be done under title II. There is no reason that I can see to exclude Water Research Institute personnel from the kind of opportunity afforded under title II. Many agencies of the Government have found the granting and contract mechanism similar to that proposed under title II to be highly effective.

I would like to interject some more material at this point. The efforts of water resources research are handicapped by eliminating the personnel and facilities of the non-land-grant universities, and the industrial and private research institutions. Water is our most critical resource. We do have water problems at a great many places in our country. We do have water problems of a great many different kinds in our country. These are problems of planning for the use of the resource, of maintaining a usable quality of water, of utilizing our ground water.

We have 14 times as much water in the ground as occurs in the lakes and streams of our country. It is important that we learn how to better utilize this source of water. We need to have better conservation practices, because if we can add usable water by conserving it, this is the same as though we got new water, but it also reduces the load of polluted water on our streams. We need talent wherever we can get it in a great many fields. Many establishments of the Federal Government have used the contract or grant mechanism with great effectiveness in their program. These include National Aeronautics and Space Administration, National Institutes of Health, Atomic Energy Com-

mission, and the Defense Department particularly. Why should we fail to take advantage of these capabilities or something as important as water?

We need to draw people from many disciplines, economists, biologists, political scientists, chemists. The efforts of the institutes have strongly pointed up the need for interdisciplinary research and the opportunities to contribute by interdisciplinary effort.

One advantage of the contract or grant procedure is that it permits investigators everywhere to come forward with their ideas, with a minimum of restraints, and have them judged on a national basis.

The water research effort ought to have the benefit of the best researcher in any area regardless of where he is located.

The national review process not only stimulates thought by the scientific community but tends to refine and sharpen the quality of the overall effort. This mechanism also provides a maximum of flexibility on the part of the administering agency to choose research in relation to priority of need. The lines of research effort may be guided somewhat by public discussion or announcement of areas of needed priority since most researchers are responsive to the interest of the sponsoring agency. Reports such as the 10-year program of Federal Water Resources Research mentioned earlier are regularly used by researchers in deciding on new research to undertake.

At this point, if I may, I would like to interject a statement on training. I would like to believe that the strength of hydrology, of our water resources effort, is derived from many disciplines, from economists, chemists, civil engineers, political scientists, physicists. We need a centrality of effort in the water resource field in training, which will bring the attention of these kind of people to how their disciplines can help improve the management and development of the water resource.

I would also like to state that in the graduate schools, the efforts of research and the efforts of education seem to meld together.

Continuing, I believe there is considerable room for expansion of the research effort in water resources. I think there are additional qualified investigators available and I urge favorable action on this bill. It is my opinion that a workable grant program as proposed in S. 22 would provide an effective arm which could deal with many important problems of water resources research in a more effective way and which could permit access to the best qualified people and facilities for many problems regardless of the institutional connections of those people.

Thank you, sir.

Mr. ROGERS. Thank you, Doctor.

Let me ask you one question. On the last page of your statement you refer to the 10-year program of Federal water resources research which I understand is a part of your office.

Dr. PETERSON. Yes, sir.

Mr. ROGERS. Could we have a copy of that? I don't think we have it.

Dr. PETERSON. It is not quite complete, sir. We hope to have it. It is being printed now.

Mr. ROGERS. Yes.

Dr. PETERSON. We hope to have it very soon, and we certainly hope that it will be up here in plenty of time to help with the deliberations of this committee.

Mr. ROGERS. Yes. If you would, furnish us with that.

Dr. PETERSON. We certainly shall.

Mr. ROGERS. Mr. Aspinall?

The CHAIRMAN. Dr. Peterson, I want to commend you on your statement. You have put together a very logical and constructive statement.

As I understand it, you were working during the past 8 or 10 months on a long-range program of Federal water resources research. You did cooperate with the administrators of the Office of Water Resources Research in the Department of the Interior, is that correct?

Dr. PETERSON. Yes, sir. Associate Director Eaton is the Interior representative on our committee, sir.

The CHAIRMAN. In your statement you make reference to certain unsolicited preproposals, under the provisions of title II. You speak about the majority of them being what you consider to be valuable proposals, with a satisfactory potential. How about the minority? Do you get some proposals that appear to you to be rather out of the ether and impractical?

Dr. PETERSON. I didn't see any that were really quite completely useless, sir. There was a spectrum of them. At the lower end of them I think there might have been 1 or 2 or 3 that I might have had questions about, in the sample of 20 that I looked at. But I think this is true of all of our research proposals.

The CHAIRMAN. You only speak about the majority. That is your evaluation of the majority. You make no reference at all to the minority, and I just wondered what your reaction was to the minority group.

Dr. PETERSON. I didn't find a large number that were what I would call poor. I assume, sir, that the screening process would certainly eliminate these, and that they would not be funded.

The CHAIRMAN. You see, even as a layman I have people approaching me with proposals, which I readily understand are proposals that would just finance somebody in a job. I wondered if those were in the minority that you looked over, or if you feel all of these proposals are well intentioned, but they just didn't bring any particular potential value to the work we have in mind.

Dr. PETERSON. It is certainly my impression, Mr. Chairman, that the proposals were well intentioned, that they were honestly conceived by the people.

The CHAIRMAN. A man may honestly conceive a proposal to keep himself in a job, can't he? You don't need to answer that. It is too obvious.

Dr. PETERSON. Maybe I could say something. That by and large the people that I work with, that I have worked with over the years in the universities, have plenty of things to do, sir. They are not particularly concerned with keeping themselves in a job. If they don't follow one line of activity or research, there are three or four others which are pressing on their intellects, and which they are perfectly glad to spend their time on.

The CHAIRMAN. I will be willing to grant that college professors and researchers are about the average run of people.

Dr. PETERSON. Thank you.

Dr. KIDD. Mr. Chairman, could I say something on that point?

The CHAIRMAN. Certainly.

Dr. KIDD. The people in the universities and in the private research institutes who are competent professionally to contribute to this kind of program are in extremely high demand. I see this from the vantage point of the Federal Council for Science and Technology where we deal with programs across Government, of the kinds that Dr. Peterson has spoken of, and I would think that one of the primary problems in the area of water resources would be to induce enough people of high talent to contribute their brains to this resource. These people, highly qualified scientists in universities, are in demand, because of the service that they can render.

So I personally wouldn't have any doubt about the competence of the group, and of additional people who could be brought into this area if money were available.

The CHAIRMAN. That brings us back to our discussion of yesterday. One of the original purposes of this bill was to bring people in, these scientists, and we had evidence yesterday and apparently we have it this morning that we have a lot of scientists at the present time who have the ability to make contributions that aren't being given a chance.

Dr. KIDD. Yes, sir, that is a common problem, too, in these programs. Mr. White, I recall yesterday, raised this issue, and it is somewhat paradoxical that you have got people that simultaneously say with respect to water resources that there is a shortage, there isn't a shortage, people are ready to work, they are not available, but typically I think since World War II there has been a general phenomenon, say, with respect to space, atomic energy, weather modification, oceanography, and a large number of fields where you have to make the choice between waiting to see whether you can be positive that there is a group of competent people able to work, or whether you proceed on the assumption that if you have a stable funding situation, a worthy scientific problem to work on, the people will appear. I think without exception, since World War II, those programs that have been of high national significance, the funding of the programs and the attention on the part of the scientific community, and a sense of the urgency problem combined with the scientific excitement that these generate tend to produce people from other fields.

One thing we have learned, space, I suppose, is the outstanding case, is the extreme flexibility of our engineering and scientific work force, that these people shift from production to research, from development to research, and that the engineering and scientific groups are really capable of moving over a fairly wide range, including, I imagine, into this area.

The CHAIRMAN. Dr. Peterson, I have but one more question, a very general question, but I wanted it for the record.

Do you think that there is any possibility, greater than the usual possibility in a research program financed by Federal money, of a waste of taxpayers' money in the program that title II would call for?

Dr. PETERSON. No, sir; I don't think the possibility—let me put it in positive terms. I think the possibility that this money will not be

wasted in this program is as good or better than most of the programs, research programs with which I am acquainted.

The CHAIRMAN. I think I will rest on that.

Mr. ROGERS. Mr. Skubitz?

Mr. SKUBITZ. I have no questions.

Mr. ROGERS. Mr. Edmondson?

Mr. EDMONDSON. I would like to ask you, Dr. Peterson, if you feel in research that is directed at getting answers to some of the Nation's needs, that it would be sound practice to give a timetable for answers that is fairly uniform across the country, or if you feel that it would be in order to give a timetable that provides for answers 1 year earlier on the eastern side of the United States than is given on the western side of the United States, just as a general proposition, where you are seeking national answers to critical resource questions that are before us.

Dr. PETERSON. I would rather reply in more general terms. As a general principle, we ought to try to get the answers for the most critical problems first, whether these occur in the West or in the East, and I would rather not do it on a geographical basis, but to attack it on where do we have great pollution problems, where do we have acute water shortages, in this context, sir, if I may say.

Mr. EDMONDSON. I have been intrigued by the fact that the Secretary of the Interior in his contract concluded with one major national research concern in the coal resource field gave that concern a deadline to reply to the basic questions raised in the research endeavor that was a year earlier for the States east of the Mississippi than it was for the States west of the Mississippi, and to me it has been a rather perplexing thing that this kind of a pattern was established, and the States west of the Mississippi were going to get answers to research questions connected with their coal resources 1 year later than the States east of the Mississippi. I have been trying to get some scientific explanation for this priority system in research.

Before I get very enthusiastic about giving the Secretary of the Interior a lot more research grant authority, I want to find out whether this is a pattern for the future, and that we States in the West are going to have to wait a year later than the States in the East to get the results on research contracts.

Dr. PETERSON. Sir, I guess you will have to pose your question to one of the Interior representatives.

Mr. EDMONDSON. I recognize that you probably are not privy to the reasoning that prevailed on this, but I am trying to establish whether this appeared to be a pattern that might have some rational explanation behind it that would readily be apparent to a scientist.

Dr. PETERSON. I think I am reasonably well familiar with the priorities and objectives of our water resources research program, and I see no such geographical priorities or no such priority on geographical grounds.

Mr. EDMONDSON. You can't see any basis in your understanding of the water problems of the Nation to give the eastern half of the United States a year's head start over the western half of the United States in research answers supplied by contractors with the Government then?

Dr. PETERSON. What I was trying to say was that I do not find among the eight agencies and departments anything but a quite ob-

jective look, weighing needs against the research that they want to do.

Mr. EDMONDSON. Well, this isn't the case where it is proposed to give the grant authority to scientists who have those objective needs. It is proposed to give the authority to make these contracts to the Secretary of the Interior.

Dr. PETERSON. Sir, I wasn't speaking about scientists who have objective needs. I was speaking about——

Mr. EDMONDSON. Agencies?

Dr. PETERSON. No; needs to solve problems in the water resources field.

Mr. EDMONDSON. What you have said immediately prior to that, that I wanted to be sure is on the record, is that you are not aware of any basis in the water resource situation in the country to give any particular geographical area of the country a big priority over any other particular geographical area of the country.

Dr. PETERSON. Not on geographical grounds as such.

Mr. EDMONDSON. Isn't it a fact that there are water resource questions that are serious in practically every geographical area of the country?

Dr. PETERSON. Yes, sir.

Mr. EDMONDSON. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Baring?

Mr. BARING. I have no questions.

Mr. ROGERS. Mr. White?

Mr. WHITE of Idaho. Thank you, Mr. Chairman.

Dr. Peterson, I am much impressed by your statement, and I had hoped that the chairman of the full committee could be here for the next remark I am going to make. Barristers and solicitors always think they have a great monopoly on logic and that they develop it probably better than most people. But I would say that someone with an engineering background usually develops logic very well, also, sometimes I think even a little better than some of the lawyers.

I think that is what you have done in your testimony here.

You have covered every point that I had a question about with respect to the legislation, even going as far as the size of projects that cannot be funded in the title I area of activity, and that they should not be excluded which is something I have been somewhat concerned about.

I think that there is just one question that I would like to ask you about with respect to your statement: You have indicated you have heard the previous testimony here, and two particular members of the committee have indicated that they are in favor of a 10-year limitation to this program, to do away with open-ended funding. You did not allude to that in your statement. I would like to know what your thinking is on either allowing the suggested repeal and amendment to the statute to go through as written in S. 22, or to follow the suggestion some of the members of the committee, that it be held to a 10-year program with review with some leadtime prior to additional legislation. How do you feel about this particular aspect?

Dr. PETERSON. I have no strong feelings about the 10-year limitation. I have confidence that it will be possible to lay before this committee the argument when the time comes. The main rationale I suppose for having a rather unlimited time is that it may be easier to get a

scientist to enter this career if he thinks it is not going to expire in 10 years.

Mr. WHITE of Idaho. Ten years sometimes to many people seems like a long time and to others it is not so long.

Dr. PETERSON. Yes.

Mr. WHITE of Idaho. However, with consideration of a 3-year lead-time, as was suggested here yesterday for the continuation of the program, it would seem to me that it might be more responsible for the Congress to implement a program with a 10-year cutoff period with a reevaluation of the program, say, 7 years after the enactment of the legislation.

Doctor, I can say this from personal experience. Talking about the interchange of disciplines from one area to another, my training was in mining engineering. I went to work as a design engineer, in the XB-29 airplane program. I found that the formulas that dealt with mine ventilation and the thermodynamic relationships that developed in metallurgical calculations applied to the transfer of heat through an airplane fuselage. I found that the flow of air through ducts and the design of blowers were equally transferrable from one field to the other. In fact, I made a success of so doing with the background that I had.

I do know that there is interchange of technical skills between various fields of scientific endeavor, and I would agree with you wholeheartedly that a person can go into one of these areas with a good foundation and make a success of even research in those areas, having that basic knowledge and the mind, the inquisitive mind, to try and find out what has to be done.

Thank you, Mr. Chairman. I have no further questions.

Mr. ROGERS. Mr. Roncalio?

Mr. RONCALIO. Thank you, Mr. Chairman.

Dr. Peterson, I have just a few short questions.

Do you feel that under title II there will be no conflict in this and the existing law regarding the fact that there must be no patents issued on new research, that all shall be common knowledge for the good of all?

Dr. PETERSON. I missed part of the question.

Mr. RONCALIO. Title II, as you know, will make available funds to the private sector of our economy for private research. Existing law requires that there be no patents for private protections of any kind, that the benefits of this research shall inure to all of the public for everyone involved, for the good of everyone. Do you feel that this will result in no conflict with the accepted practices of private research corporations whose practice as you know is to obtain patents understandably for their profit as a result of this research?

Dr. PETERSON. I am afraid I am not too well prepared.

Mr. RONCALIO. This is more of a legal and public policy question than it is a technical one.

Dr. Peterson, my second question is this: I want you to know that I appreciate your testimony and I share your pride in your own accomplishments in science and technology as a Utah citizen. I have a nephew whose name is also Dr. Peterson. His initials, however, are Dr. Don Lee Peterson, a Ph. D. in petrochemicals with Shell Development Laboratories at Emoryville, Calif., and also a native of Utah.

And I will be happy to let him know that I have met you this morning.

Thank you very much, Mr. Chairman.

Mr. ROGERS. Any other members?

Mr. Baring?

Mr. BARING. Along the lines of the inquiry of the gentleman from Wyoming—Utah State College is at Logan?

Dr. PETERSON. At Logan, sir.

Mr. BARING. Some 23 years ago I took a course in electronics, for Navy radar at Logan. Were you there at that time?

Dr. PETERSON. No, sir, I was in the Navy.

Mr. BARING. I wanted to know for myself. It is a very fine college, I can tell you that. There was a math teacher there who I think was the smartest man I ever met in my life. He could divide by four digits and do it mentally.

Thank you very much.

Mr. ROGERS. Doctor, there is one question. It is my understanding that in the implementation of section 305 of Public Law 88, I think that is 379, that the Office of Science and Technology has been given the responsibility for clarifying agency responsibilities for water resources research, and providing interagency coordination of such research. Would you provide this committee for the record a copy of the President's Executive order or whatever memorandum you have that gave you this responsibility, so that we would have it for the record here in this case?

Dr. PETERSON. Yes, sir, I am sure we can do this.

Mr. ROGERS. Thank you very much.

Dr. PETERSON. Thank you.

(Memorandum from President Lyndon B. Johnson follows:)

THE WHITE HOUSE,
Washington, D.C., October 24, 1964.

Memorandum for: The Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Health, Education, and Welfare, the Chairman of the Atomic Energy Commission, the Director of the National Science Foundation, the Secretary of the Smithsonian Institution, the Chairman of the Tennessee Valley Authority, the Director of the Bureau of the Budget, and the Director of the Office of Science and Technology.

Public Law 88-379, the Water Resources Research Act of 1964, provides that the President clarify agency responsibilities for Federal water resources research and make arrangements for interagency coordination of such research.

In view of the continuing nature of this function, I am asking the Director of the Office of Science and Technology to assist me in this responsibility in close cooperation with the Bureau of the Budget and the departments and independent agencies which are concerned.

The area of water resources research is a particularly difficult one to coordinate because of overlapping statutory missions of numerous agencies. Fortunately, this has been recognized for some time, and substantial progress has already been made. The Office of Science and Technology and the Federal Council for Science and Technology have given special attention to water research for 3 years, and in December 1962 established a Committee on Water Resources Research. The report of that Committee, "Federal Water Resources Research Program for Fiscal Year 1965," which I transmitted to the Congress in March of this year, is evidence of the value of such cooperation.

I shall, therefore, continue to look to the Director of the Office of Science and Technology for leadership in these matters, and request that he keep me informed, in order that the objectives of these coordination responsibilities are fully realized.

Public Law 88-379 also states that there shall be established in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources.

The Science Information Exchange has been making good progress in cataloging such research and shall be the general purpose facility for such cataloging. As required by the act, each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. Beyond this, it is expected that the Federal agencies will, in turn, make full use of such cataloging center in addition to internal information systems and other means which may be required for good management.

It is recognized that in the enactment of Public Law 88-379 a particularly difficult responsibility falls upon the Secretary of the Interior to so administer the act that it contributes to a comprehensive and coordinated nationwide program of water resources research. He will be required to obtain the continuing advice of all agencies concerned. I expect all those agencies concerned to extend their full cooperation to the Secretary in achieving this objective.

LYNDON B. JOHNSON.

MR. ROGERS. I believe our other witnesses were changed around and we talked to them yesterday, so that our next witness scheduled this morning will be Dr. Harold Wilm, on behalf of the Interstate Conference on Water Problems.

Doctor, welcome to the committee, and we will be glad to hear your testimony.

**STATEMENT OF DR. HAROLD G. WILM, ASSOCIATE DEAN OF THE
COLLEGE OF FORESTRY, SYRACUSE UNIVERSITY**

DR. WILM. Mr. Chairman, it is a privilege to appear before you again.

Mr. Chairman, I have a very short prepared statement which I will read.

My name is Harold G. Wilm. I am associate dean of the College of Forestry, Syracuse University. I am testifying today for the Interstate Conference on Water Problems. I am its immediate past chairman and a member of its executive committee.

The Interstate Conference on Water Problems is a national organization of State officials concerned with all phases of water resources planning, development, use, and administration. It is vitally concerned with water resources research. When the legislation which became Public Law 88-379 was before this committee, my very close friend, Sam Thompson, then the chairman of the Mississippi Board of Water Commissioners and a member of the executive committee of the interstate conference, testified in its support.

Then and now one of our concerns is that there be as much flexibility as possible in the Federal water resources research program. We appreciate that the Water Resources Research Act has laid an appropriate foundation for a strong program. We feel that the current legislation is needed to supplement that program—to make it possible to take advantage of already existing or embryo research organizations or programs connected with governmental entities. We believe that the legislation before you would aid in overcoming the current great shortage of talent in the water research field by utilizing fully and strengthening existing capabilities.

I might emphasize at this point that while in some fields it is my impression that there is enough research talent to meet many of these

problems, the great shortage, especially in the drought-ridden area in the Northeast, is of trained personnel, engineers, hydrologists, soils people, and so on, trained personnel to do the necessary planning and development of water resources in our northeastern country.

In New York State especially we have recently, the people of the State have, passed a Water Pollution Bond Act calling for a billion dollars worth of water pollution control, which will create a tremendous demand for trained engineers, for screening and designing and building the necessary sewage treatment plants.

Also, before I left, as chairman of the water resources commission of the State, the Governor asked me to spearhead the development of an accelerated water supply program for the State. There again we are trying to recruit all kinds of scientists and engineers to get this program planned and put into execution just as fast as possible. This means great shortages.

Finally, we believe the language of the several bills guards against duplication of research effort.

Mr. Chairman, the present legislation deals with a real—not a hypothetical—situation. We understand that there have been submitted a number of requests for funds for research which do not qualify for aid under current law, but which would be eligible if the law were amended as is proposed by the bills before you. We understand further that some of these requests have come from State agencies. Not unnaturally, we are extremely interested in enhancing the research efforts of States.

This is our particular mission in the interstate conference.

Mr. Chairman, since this is a very brief statement, I am sure you will permit me to express to you and your colleagues our gratification for your unremitting efforts in the water and natural resources fields in general. Thanks to such efforts, we have witnessed the enactment of one major piece of legislation after another in the last several Congresses. Human nature being what it is, your reward as legislators more often than not is brickbats, but, speaking for one group of State officials nationwide, I want you to know that we are deeply appreciative of the fine work of this committee and the Congress.

Thank you, Mr. Chairman.

Mr. ROGERS. Thank you, Dr. Wilm.

Let the Chair thank you for your statement, for its brevity, its conciseness and I guess you would say to the point and its focus on the problem. I have only one question, myself. You speak of the drought, the drought-stricken areas of the Northeast.

Dr. WILM. Yes.

Mr. ROGERS. Now, that would indicate, Doctor, that there is a definite shortage of water in this country.

Dr. WILM. This is a very interesting point. If you will permit me I might cite a humorous little tiny anecdote about a cowboy friend of mine.

Mr. ROGERS. Would you, please?

Dr. WILM. From Arizona who came back from the Adirondacks, who came back to advise us in the conservation department on building horse trails. When I got him back there his first reaction is "Our problem is dust; your problem is mud" even in the drought-ridden Northeast.

Then I took him in a motorboat out in the middle of Lake George 30 miles long and wide and surrounded with forests and he said, "Will you look at all that water; can you sell it?" And of course the answer is that there is abundant water, but it is dedicated to hunting and fishing like all the Lake States are dedicated in a similar way. Primarily the problem we have has been touched upon several times. It is not so much amounts of water but storage and distribution, especially distribution.

New York City, for example, gets almost half of its water supply from the Delaware River Basin, and it has expended something like \$800 million in reservoirs, conduits and canals to divert the water from the Delaware into the Hudson. Yet during this 4-year drought which may possibly run into a fifth year you know from the daily reports in the Times that New York City is very, very short of water and we are having to ration it, so that its storage and distribution which is the problem rather than the shortage over the Northeast.

Mr. ROGERS. Along the humorous side you know there is a story out in my district of a drought that lasted 7 years and when the first drop fell it hit a widow woman in Claude, Tex., and she fainted and it took two buckets of dust to bring her to.

But the point about the distribution is simply this. That if you did not have a shortage area, there would be no need to worry about distribution, would there?

Dr. WILM. That is true. Of course, this is nationwide.

Mr. ROGERS. I understand there is quite a controversy inside some of the Government agencies on the point of whether or not there is a shortage.

Now, what this committee is looking for is for facts, and not a bunch of, well, fancy language that doesn't mean anything, because if you have—take New York State, for instance, if you didn't have all the people living in New York State that you have there, you wouldn't have a water shortage.

You would have a surplus.

Now, water in the Colorado River out on the other side of the Divide isn't much help to the city of New York, if they are short of water, unless you can get there, and vice versa, I think that what we need in this country is an understanding as to the problem, and I appreciate your approach to it, that whatever the problem is, the needs of human beings is the primary premise from which we have to start.

Dr. WILM. Yes.

Mr. ROGERS. And if distribution is your problem, then it would seem to me that the answer would be whether or not it is more economically feasible to transport water from Alaska down to the western part of the United States or whether it is better to try to step up the desalination program, and whichever one comes out with the least expenditure to meet an absolute human need, there isn't any substitute for water, I think this is the thing we are hunting for, and I appreciate your approach, and I think that if all would be quite factual about these problems and to the point, I think we would get along much better and make much more progress.

Mr. Edmondson?

Mr. EDMONDSON. Thank you, Mr. Chairman.

Dr. Wilm, I don't want to throw any political dust in your face, but I would like to ask your view on the basis of your national experience in water problems. Can you conceive of a research contract dealing with water problems that logically would have a deadline for the States east of the Mississippi 1 year earlier than the deadline given in the research organizations for the States west of the Mississippi? Can you conceive of such a national research problem?

Dr. WILM. Of course, for a number of quite obvious reasons, I can't speak for the Secretary of Interior's reasoning in establishing a different deadline for the East and the West. Intuitively, however, I might suspect that the great focus of attention in the quite recent past on the drought problems of New York City and the Northeast in general might have stimulated establishing such an earlier deadline.

Mr. EDMONDSON. I have no quarrel at all with giving an early deadline to New York City, but do you think that when you are taking a national approach to a question, that the problem of a city in the East would justify giving a deadline for the Nation that was a year earlier in the East than it was for the West?

Dr. WILM. I agree with you, sir, that I don't quite follow the reasoning, especially when you consider that western water problems are not only terribly serious, they are of long standing, and many of them are still unsolved.

Mr. EDMONDSON. I would like to feel that a city in the West that had a very urgent water crisis, and I think there are some that have it, would be dealt with on the same basis as a city in the East with an urgent water crisis, and that when these contracts are awarded under this bill, and I expect the bill will pass and that money will be appropriated, that the contractors will recognize the fact that the West was settled after the East doesn't make it a year behind in its entitlement to national answers when the Government pays for them.

Thank you. No further questions.

Mr. ROGERS. Mr. Skubitz?

Mr. SKUBITZ. I have no questions.

Mr. ROGERS. Mr. Baring?

Mr. BARING. No questions.

Mr. ROGERS. Mr. White?

Mr. WHITE of Idaho. No questions, Mr. Chairman.

Mr. ROGERS. Thank you very much, Mr. Wilm, for your presentation.

Dr. WILM. Thank you, sir.

Mr. ROGERS. Our next witness is Dr. Allen F. Agnew, director, Water Resources Research Center, Indiana University.

Dr. Agnew, let the Chair welcome you before the committee.

STATEMENT OF DR. ALLEN F. AGNEW, DIRECTOR, WATER RESOURCES RESEARCH CENTER, INDIANA UNIVERSITY

Dr. AGNEW. Thank you, Mr. Chairman.

Mr. Chairman and other distinguished gentlemen, I am director of the Water Resources Research Center at Indiana University. I am honored and so is my university to be invited to appear before you to discuss legislation which will extend the impact of the water resources

research program through S. 22 and companion measures H.R. 3606, H.R. 5930, H.R. 6282, and H.R. 8916.

I have a prepared statement from which I should like to depart occasionally, Mr. Chairman, if I may.

Mr. ROGERS. Yes; you may proceed.

Dr. AGNEW. Thank you.

Mr. ROGERS. If you would let us know when you depart from it.

Dr. AGNEW. All right, sir. I shall.

First with regard to my own background, I am a geologist. I spent 3 years with the Illinois State Geological Survey, mainly working in fuels, coal and oil, then 13 years with the U.S. Geological Survey working in metals in Wisconsin and California, metal mining, and in water in Iowa, and then in South Dakota where for 6 years I was head of the State geological survey, and half of the funds, half of the attention that this research organization put on resource matters was on water resources. And then since 1963 I have been at Indiana University as professor of geology and director of the Water Resources Research Center there.

At Indiana University we have a field station, a western field station in western Montana, a geologic field station, where we train students, undergraduate and graduate students, in all phases of geology from all over the country, and this we feel is not only helpful and refreshing to the physical well-being of us easterners, our flatlanders, but it also permits us to train our people in the West as well as in the East, so we feel this gives our people some of the breadth that they should have.

Returning to my prepared statement here, the enactment of Public Law 88-379 was a welcome recognition by the Congress of the urgency for a greater water research effort, as we look for answers to problems that are already upon us, and as we tackle those of the future, whose solution will determine largely the course of the continuing development of our Nation—its resources, its beauty, and our enjoyment of them.

The Congress is to be commended for this investment in our Nation's future, as evident not only through its enactment of Public Law 88-379 and its appropriations for water research by university centers through the Office of Water Resources Research, but also through its appropriations to other Federal agencies for their ongoing programs, both in-house and extramural, of water data gathering and interpretation.

Mr. Chairman, I would like to depart here for a moment. I would like to stress the extreme importance and value to us at the university level of these data-gathering services in the water research activities carried on by the various Federal agencies and their State counterparts, many of which have cooperative programs. These agencies produce data that are basic to studies that we carry on. In other words, we start with what they have done as a foundation, and then we gather additional data and try to bid from there. So we depend on them very heavily.

Returning again to my statement, the establishment of title I centers at the land-grant university in each State is a valuable mechanism for implementing the provisions of Public Law 88-379 in providing a basic allotment to each of these schools; this has permitted them to fund the administrative organization of their centers on a

continuing basis. Title I centers also may perform research under a matching-grant provision of the law, from the limited funds available. Cooperative relationships between the title I school and other universities have permitted them to share in these matching-grant funds. However, the appropriations for such projects are far below those authorized by the law, and thus the inadequate funds are not getting the job done that has been recognized as an urgent need in the report of the Senate select committee, the Kerr committee, on national water resources in 1961 and similar studies.

Thus, although we are pleased with the new water research effort that is underway because of Public Law 88-379, there remains a huge resource of capable research workers—and I should like to insert these research workers are associated with the educational process. They are training graduate students and, of course, faculty are also doing research. These graduate students are being trained to fill these positions in water-related activities that have been mentioned both yesterday and today in the hearings, and of which you are all too well aware. Continuing, these research workers in title II universities as well as in title I schools. These great capabilities could be brought to bear on water problems if a workable title II provision could be achieved.

Many examples of water research projects could be cited at several title II universities, and they have been mentioned both yesterday and today. I wish to call your attention to one, which has just been published by Indiana University, and I believe you may have a copy of that.

Mr. EDMONDSON. They have been supplied, yes.

Dr. AGNEW. Thank you.

This project dealt with the problem of surface, or strip mining, which is continually being brought to our attention these days through the public press. Current research on this problem of surface mining by governmental agencies, by universities, and by the coal industry, has been directed toward the two major problems of (1) acid-mine drainage and (2) reclamation of altered and scarred landscape.

However, there are many more facets to the problem than these two. Our study assessed the potential water storage provided by the piles and ridges of displaced overburden called spoil banks. We found that in the exceedingly dry fall of 1964 a strip-mined area in southwestern Indiana contributed approximately one-fourth second-foot of water per square mile per day, or 175,000 gallons per day, to the streams during the 3-month period while streams in a similar controlled but unstripped area nearby were dry.

This hydrologic phase of the surface-mining problem had not been attempted heretofore, and we intend to amplify this study by considering the floor-retention capabilities of these manmade "dams," as well as the variations in the quality of the water.

I should like, Mr. Chairman, to request that this publication be made part of the record.

Mr. BARING. Without objection, it is so ordered. It will be put into the file.

Dr. AGNEW. Thank you, Mr. Chairman.

This project was supported solely by mining industry funds, as Federal and State funds were not available. One may ask why this type of support could not continue. It can, and we expect it to. However, we also expect that, because there are Federal and State laws and regulations which govern the surface-mining industry, and because new regulations are undoubtedly going to be considered and enacted, the Federal and State Governments likewise have a stake in such research and should be parties to it through such mechanisms as title II.

To create a workable title II provision in Public Law 88-379 is the main purpose of S. 22 and the companion measures which we are discussing today and did discuss yesterday.

Certainly the level of funding recommended in these measures is a must, if we are to perform the amount of research that is needed.

Title I permits a basic program to be carried out, but title II would permit us to mount special projects, as we have heard both yesterday and today, projects where 50-50 matching would not be possible by the States, and where the magnitude of the project is too great for the normal type of matching grants under title I as Dean Peterson has just pointed out.

For example, we at Indiana University have a title II proposal—I believe they call them preproposals in the earlier testimony—for research in a complex hydrologic area of southern Indiana where we could assess through one large, integrated project the water resources in several subbasins of the Ohio River Basin. This project would cost more than \$200,000 and even though spread across 2 or 3 years, would not be amenable to the matching-grant program available under title I. Similarly we have a research proposal that would cost roughly \$300,000, for water research work in western Montana near our geologic field station, which would encompass 2 or 3 fiscal years. In both of these projects, the acquiring of basic data on groundwater resources, as was just stressed by Dean Peterson, by drill holes and observation wells constitutes the major part of the cost. Without this information neither of these projects would be worth attempting; on the other hand, each of these two projects would serve as a guidepost for further research in those areas and in other regions of similar hydrologic environment, and thus a multiplier effect would be realized.

I would expect that any project proposal that our colleagues at Indiana University would submit, would be subject to scrutiny by any person. It is incumbent on us to have a project that is addressed to meet a specific need, whether it is one that uses current theories and new data, or one that devises new theories to test either or both old and new data.

However, it seems that the Congress has given the authority to the appropriate agencies, and expects them to be staffed with personnel who can judge the Nation's needs. To run a proposal through two sets of competent judges does not seem necessary, but is not in my province to decide.

In concluding my statement, Indiana University congratulates the past Congress in achieving the first step, Public Law 88-379, and we urge the present Congress to take the next and equally important step, that of passing S. 22 or companion legislation which will enable

a much wider reach of the total research talent of the Nation, as we attempt to solve more of the vexing water problems which confront us today.

That, Mr. Chairman, completes my statement. Thank you.

Mr. BARING. Thank you for a very fine statement, Dr. Agnew.

Are there any questions? The gentleman from Oklahoma.

Mr. EDMONDSON. Dr. Agnew, I thought it was a fine statement and I thought your illustrative report was very interesting, too. Have you completed your project on reclamation of the mine-scarred landscape?

Dr. AGNEW. No, sir. This report is just the first step. This is leading to a tremendously expanded project. More coal mining companies are going to be involved. We hope, of course, that there will be Federal and State money involved, too. This will involve other disciplines besides strictly hydrology, which is what we have used right up to now.

Mr. EDMONDSON. What kind of timetable do you have on your reclamation project?

Dr. AGNEW. I will have to walk on eggshells a little bit here, because we have planned this in stages. Reclamation efforts, reclamation research in Indiana has gone on to contracts with Purdue University I believe over the last 15 years or so, and they are continuing. They have again begun research this year on the reclamation reforestation in Indiana, and we anticipate, because of the interest in an interstate mining compact, that there will be much greater emphasis on this.

We do program this as part of our work from the standpoint of botany, forestry, but also the chemistry of the water and of course the fish life, this sort of thing, aquatic biology that goes along with it.

Mr. EDMONDSON. Have coal companies contributed to your research project on water supplied by coal surface mines?

Dr. AGNEW. Yes, sir. This funding was solely from the coal mining companies, and I am very pleased to report that they did not ask us, as one might think, and as we have heard sometimes in the press, they did not ask us to make sure that this is a project, you know, that will show something in good light. This is one thing that you get, as you recognize when you buy a university research contract, and that is a factual, objective, overall look at the problem.

Mr. EDMONDSON. I will be very interested in seeing the results of your other projects, and I would appreciate it, if you can do so, if you would supply to the Committee on Interior the results of that other study when it is completed.

Dr. AGNEW. Yes, sir.

Mr. EDMONDSON. It bears directly upon another field of study being made.

Dr. AGNEW. Yes, sir, thank you.

Mr. BARING. Mr. Skubitz.

Mr. SKUBITZ. No questions.

Mr. BARING. Mr. White.

Mr. WHITE of Idaho. I have no questions.

Mr. BARING. Mr. Roncalio.

Mr. RONCALIO. No questions.

Mr. BARING. Thank you. We appreciate your testimony very much.

The next witness is Mr. Ernest F. Brater, professor of hydraulic engineering, University of Michigan.

STATEMENT OF ERNEST F. BRATER, PROFESSOR OF HYDRAULIC ENGINEERING, UNIVERSITY OF MICHIGAN

MR. BRATER. Mr. Chairman and members of the committee, I appreciate the opportunity to be here. I feel a little humble because there have been chairmen or executives of various kinds ahead of me, but I do represent the university. Our vice president who might have been here could not make it, and has asked me to appear in his stead, the excuse being that I have been our representative to the university council on water resources, and maybe from the point of age I have been in the hydrological research since 1933 or 1934, and continuously in the United States and elsewhere in hydrology ever since.

My name is E. F. Brater, professor of hydraulic engineering at the University of Michigan. I would like to read a short prepared statement, and I have the benefit of having heard some of the other testimony, and knowing some of the questions of the committee, if with your permission I might deviate from the text, and I will tell you when I deviate.

MR. BARING. Without objection, it is so ordered.

MR. BRATER. Research and education in all aspects of water resources development and conservation are important to the future welfare of the country.

Funds should be made available to centers of technical competence for financing expanded programs of research and education in order to help solve the problems and meet the manpower needs of the future in the water field.

I would like to inject one sentence at this point. I think in the first two paragraphs you will notice that I have used the words "research and education" with equal weight. I have in my office a stack of letters asking for people in this field to put people that have positions available that have written to me, and I know that we are not training people fast enough to do the job that has to be done, and the research funds as we have used them at the university have invariably been put to the purpose of training people toward the Ph. D. or the master's degree at the time they were working on research. We always have felt that the educational part is as important as the research part.

Back to my text then, placements of the grants should be made on the basis of the potential value of the proposals and the quality of the personnel and programs existing at the various institutions. Special attention should be given to institutions having well-developed interdisciplinary programs on water resources.

The present Water Resources Research Act (title I) will serve a valuable purpose by establishing a clearinghouse for information in each State and by stimulating research activity at the land-grant colleges. However, there are many non-land-grant universities in the United States that have made particularly strong contributions in the water field over a long period of years. It is important to the welfare of the country to take advantage of the on-going programs and talent at such institutions in order to advance research and education in the water resources area as rapidly as possible. There is also an element of fairplay involved in that groups that have had the foresight and perseverance to find funds and undertake research and development in

the water field should not be excluded from the opportunity to apply for any research funds that may now be made available.

By way of illustration, the University of Michigan has research and teaching programs in the following disciplines within the general water resources area: hydrology, watershed management, sanitary engineering, forest hydrology, water development planning, environmental water management, hydraulic engineering, water resources economics, meteorology, geology, fisheries biology, limnology, and law.

I would like to interject at this point, since the question about how law might get into the picture came up a number of times yesterday, and point out that among the problems that we face is flood plain planning, which in urban areas becomes very difficult, and I think requires new laws, a new legal approach, and this would be just one aspect of legal research that is being undertaken right now.

Returning to the text, teaching or research programs which involve more than one of these disciplines are coordinated by the University Committee on Water Resources. Students are encouraged to plan a program involving more than one discipline. Individual faculty members already are involved in research programs within their own fields of competence. Some graduate students are being supported on research assistantships or fellowships. The interest and talent for an expanded program and for interdisciplinary studies are available in the various faculties. High-caliber graduate students will be attracted to the water resources area in greater numbers as soon as more stable research financing becomes available.

I would like to interject at the end then in regard to more stable research financing, I think this is tied in which the question that has been raised a number of times regarding whether the 10-year limitation should be put on or not. It takes about 5 years to train a man from the bachelor's level to the Ph. D. level, if he is working half time on a research project. So that a project to have the possible benefit and to give stability and say peace of mind to a faculty man who is dealing with such a student ought to have a 5-year, if it is that kind of a project, ought to have at least a 5-year tenure, and so 10 years, I think, is as short as any limitation that you might put on. I agree though that this whole program should be reviewed, and from the point of view of your committee, this is a very important thing, and I think it should be for all of us. But we do need a certain sense of continuity and security in establishing research projects of this kind, I think.

Thank you very much, Mr. Chairman.

Mr. BARING. We are very glad to get that testimony. You are in agreement then with the original bill before us right now.

Mr. BRATER. It seems to me if we have an opportunity to know, I think 3 years was mentioned in advance that this was being reconsidered, we could warn potential candidates that the program might stop.

Mr. BARING. The gentleman from Idaho.

Mr. WHITE of Idaho. In line with what you just said, sir, the purpose is not necessarily to have a 10-year limitation on the program. I do not foresee the relaxing of the need for water resource research, but to perhaps take a new look at the direction of water resource research, and the purpose of the 3-year leadtime would be not to

forewarn some one of the end of the program, which possibility, of course, would exist, but to have adequate time for congressional deliberation on the program so that it could be continued or redirected in some other direction. The purpose was not with the idea of curtailing it at the end of the 10-year period, with respect to my own remarks in this area. I appreciate your testimony, and if you should care to comment, I would like to hear your comments.

Mr. BRATER. In regard to what you just said, I think when you are sitting in a university some 500 miles distant from Washington, and knowing that our whole way of life in graduation training has changed in the last 10 years, and that is that we hardly ever have graduate students who are not financed in some way or other by fellowships or research assistantships; this is hard for an old man like me to come to grips with, but we have had to do it, that occasionally we do run into situations where we do not know what is happening, and you have four or five young men who are working for you in your office, and their future is sort of in your hands, you do occasionally have the feeling that something nebulous gives you too much to worry about, and I appreciate your remarks.

Mr. WHITE of Idaho. Thank you.

No questions, Mr. Chairman.

Mr. BARING. Mr. Skubitz.

Mr. SKUBITZ. I have no questions.

Mr. BARING. The gentleman from Wyoming.

Mr. RONCALIO. Thank you, Mr. Chairman.

Just one observation that I would like to put in the form of a statement if not a question for Dr. Brater. I would like for you, sir, to take back to your University of Michigan these observations of mine, for whatever they may be worth, if anything. The University of Michigan has one of the Nation's outstanding law schools I have learned——

Mr. BRATER. Yes.

Mr. RONCALIO (continuing). Both in my legal training and in my years of practice, and from a position as chairman of the International Joint Commission of the United States and Canada, a job which I held for 3 years, I learned that there is great need for more cooperation with Canada on the management of water resources of common lakes containing international boundary waters of the two nations. I would like to think, since you mentioned the word "law," and since the chairman of the full committee inquired quite diligently yesterday as to how these funds could be used in the field of water law, that the University of Michigan Law School might see fit to do research in international law, international relationships with Canada, looking to correction of pollution. To improving qualitatively as well as the quantity of water in the Great Lakes, particularly to look to the reversal of the Harricanaw which would do great things for your State, for the United States as well as for Canada, and also for bringing waters in from the Hudson Bay, even though it may be salty, into the estuarial areas of the waters on the north half of the Canadian continental divide.

I would like to suggest that as a possibility for your school, Mr. Brater.

Mr. BRATER. I appreciate that, and I will be very glad to take that back. I am sure you know that there is an association called the Great Lakes Commission which has participants from Canada, from Canadian Provinces.

Mr. RONCALIO. Yes.

Mr. BRATER. And this is a vehicle for beginning such things.

Mr. RONCALIO. Yes. Perhaps that vehicle plus the International Joint Commission plus these others may all be asked to help in this, but somewhere, somehow, something new, with movement, is sorely needed.

Mr. BRATER. Yes.

Mr. RONCALIO. Because the present plan is inadequate.

Mr. BRATER. That is right.

Mr. RONCALIO. Tragically inadequate both from the Canadian standpoint and from our own.

Mr. BRATER. Yes. Thank you very much; I will take that back.

Mr. BARING. Thank you very much, Mr. Brater.

Mr. BRATER. Thank you for letting me participate.

Mr. BARING. Our next witness is Dr. Jacob Bregman, director, Chemical Science Division, IIT Research Institute.

STATEMENT OF DR. J. I. BREGMAN, MANAGER OF THE WATER RESEARCH CENTER OF THE IIT RESEARCH INSTITUTE AND CHAIRMAN OF THE WATER RESOURCES RESEARCH COUNCIL

Dr. BREGMAN. Thank you, Mr. Chairman.

Mr. BARING. Dr. Bregman, we welcome you before the committee.

Dr. BREGMAN. Thank you, sir. I have a prepared statement, and I would like to make occasional interjections which I will identify as such if I have your permission.

Mr. BARING. Without objection, it is so ordered.

Dr. BREGMAN. Thank you, sir.

I am honored to have this opportunity to appear before you on behalf of the two organizations I represent. I would like to begin my statement by identifying them for you. The first group is the Water Research Center at the IIT Research Institute, of which I am manager. I would like to interject parenthetically that IIT stands for the Illinois Institute of Technology, located in Chicago. Some 1,800 scientists and supporting personnel at the IIT Research Institute are engaged in a wide variety of government and industrial research programs. We cover a number of scientific disciplines such as physics, chemistry, metallurgy, ceramics, astrosiences, electronics, mechanical engineering, life sciences, and computer technology. The recent upsurge in research in various phases of water resources has led to the establishment of a water research center in our organization so that our activities in this area may be better coordinated and tuned to the national needs.

The other organization that I represent today, as their chairman, is the Water Resources Research Council. This is a nationwide group made up of representatives of a number of universities, research institutes, and industrial firms that are concerned with our water prob-

lems. A partial list of organizations represented on the council is as follows:

Indiana University
Cochrane Corp.
Midwest Research Institute
Travelers Research Center
IIT Research Institute
Mellon Institute
Ionac Chemical Co.
Princeton University
Cornell University
Battelle Memorial Institute
Massachusetts Institute of
Technology

University of Florida
Stanford Research Institute
Resources for the Future, Inc.
Melpar, Inc.
Cyrus W. Rice & Co.
Dorr-Oliver, Inc.
Drew Chemical Corp.
Johns Hopkins University
Industrial Water Engineering
Magazine
Polytechnic Institute of
Brooklyn

A number of the members of this organization and others are appearing here to testify this morning after my testimony, and these include Dr. Kelley of the Stanford Research Institute, Dr. Lambertson of Spindletop, Dr. Shea of Midwest, Dr. Feldmeier of Franklin Institute, Mr. Burns of Cyrus Rice, Dr. Maass of Harvard, Mr. Butrico of Battelle, Dr. Gregor of the Polytechnic Institute of Brooklyn, and there is a prepared statement by Mr. Walker, the editor of Industrial Water Engineering which is submitted to you. He is unable to appear.

Resuming my prepared statement, at a meeting of the Water Resources Research Council that was held in Washington in December 1964, the situation with regard to water resources research was the subject of an all-day conference. The conferees then adopted the following resolution which I should like to read to you.

"Resolution:

"We, the members of the Water Resources Research Council, meeting at the Brookings Institute, Washington, D.C., on December 17, 1964, and representing universities, research organizations, and industries of America, recognize the vital importance of water as a natural resource and the critical role of research in providing knowledge to assure the conservation and best possible use, in the broadest sense, of the national water resource, and do hereby commend the 88th Congress for its wisdom and foresight for passing the Water Resource Research Act of 1964; and

"Whereas the Water Resource Research Act of 1964 is a significant step forward, it is still inadequate to meet the water resource needs; and

"Whereas water resource problems are becoming more critical throughout the Nation: Therefore be it

"*Resolved*, That we request the U.S. Congress to implement in full the appropriations recommended in title I of the Water Resource Research Act of 1964 and take any additional action necessary to enact legislation as stated in Senate bill 2 of the 88th Congress as it relates to title II of that bill; and be it

"*Resolved further*, That we make known to the Congress the availability of research talent and facilities that can be brought to bear on national water resource problems only through the full implementation of title II, as stated in the original S. 2 of the 88th Congress."

Gentlemen, I would like to sum up the attitudes of the organizations that I represent with the following comments:

First, we would like to congratulate the House of Representatives, in general, and this committee and subcommittee specifically, on the awareness of our national water difficulties that you showed when you passed the Water Resources Research Act of 1964. It is particularly

encouraging to observe that in addition to the immediate corrective measures that can be taken in the area of water pollution prevention and to the longer range program of the conversion of saline water to fresh water that Congress has developed, you also have had the foresight to recognize that the ultimate solution to the more effective utilization of our national water resources is dependent to a great extent on breakthroughs in research on new approaches to water conservation and reuse. It is true that we are not yet utilizing all our knowledge on pollution prevention and water conservation, but it is also true that dramatic new developments are necessary that can come about only through an adequate research program.

The 1964 water resources research bill made a promising start toward marshaling the research capabilities of our country into an attack on the problem, but fell short of our needs. While making a commendable start toward developing and utilizing water research technology at land-grant colleges, the bill, for all practical purposes, eliminated the use of the tremendous amount of water resources research know-how that exists elsewhere. There are large numbers of scientists, expert in water technology, who are anxious to use their knowledge on this problem of national concern and who are frustrated by their inability to do so under the present law. These scientists are employed by private universities, research institutes, and industrial firms as well as State and municipal agencies and constitute the overwhelming bulk of our national talent in this area today. Go to any meeting of significance in almost any phase of water technology today and you cannot help but be impressed by the facts that (a) there is a larger supply of talented researchers in water technology available in our country today than in all the rest of the world put together and (b) the overwhelming majority of these talented scientists cannot contribute to our water resources research effort under the present law.

If I may interject, sir, I would like to point out that this is obviously changing and is changing rapidly because of title I, and I appreciate that, and we are happy to see that.

A further ironic touch is the fact that much of the background and knowledge that the "frustrated researchers" in universities and research institute have was developed with Government money under contracts for other purposes by other Government agencies. To fail to utilize this talent that the Government has paid to develop at a time when it is desperately needed is an inconsistency. We urge you from the points of view of economy and efficient use of technology to allow us to use these skills for our country's benefit.

I should also like to call to your attention the fact of industry's representation and participation in our efforts. Industry has been the "whipping boy" for a long time in many of our water problems. They now say to you: "We have water technology know-how available and we are anxious to use it to help solve the Nation's water resources difficulties." How can we fail to take advantage of this large reservoir of ability?

In terms of specifics, the present water resources research law is deficient in that the funding presently allocated under title II for research by groups of the types that I represent is only a token sum. In addition, the complication created by the provision for submission of

contracts to congressional committees means, from a very realistic point of view, that title II funding has been eliminated by the Government. We believe that the provisions of S. 22 and the analogous House bills such as H.R. 3606 will correct these problems and allow the full competence of the scientific community in the area of water technology to be brought to bear on the national water resources needs.

It might be of interest to the committee if I were to cite a few examples of the types of water research know-how, as applied to practical problems, to which I have reference. I would like to interject here that while most of the conservation so far has been about adequate distribution of water, I would like to give you examples of other ways of conserving and using water, such as purification reuse or prevention of loss through evaporation and so forth. These are all very important techniques, too, gentlemen, and in many cases they are simpler, more effective, and more efficient than trying to solve difficult distribution problems.

One very promising hope for water pollution control is by the possible use of reverse osmosis membranes to purify polluted water on a large scale. Some of the initial experiments along these lines are already underway. It is generally agreed that this technique is theoretically feasible, but that what is now required is the development of better membranes and the prior research on how these membranes function so that tailormade improved systems can be designed. Know-how in this area rests in a very few laboratories today, such as our own. None of the four or five competent research teams in this area qualify for the water resources research program as it is presently constituted.

Another very hopeful approach to the water pollution problem consists of the removal of both natural and industrial impurities by the use of effective coagulants. The needed research here is an understanding of the mechanism by which polymeric coagulants function, and how to chemically synthesize better ones. Once again, most of the technological know-how rests in research groups that are not covered by the bill as it presently stands.

Prevention of water loss (*a*) through evaporation from reservoirs, or else (*b*) by permeation through the banks of ditches that carry irrigation water to the points where the water is used would be of great value to the increase of our total available water resources. Both of these problems have been studied in laboratories and some promising leads have been found. Both need considerable additional research before they can be put into use. The potential increase in the amount of water available to this country is so great that these two research problems should be pushed as intensively as possible. Once again, a great deal, indeed perhaps the bulk, of the knowledgeable scientific talent in these areas is found in groups that would not be eligible for Federal support under title II.

I would like to depart from the text here, sir, to give examples, a few additional examples of more general problems. For instance, just selecting at random a number of programs that my own organization has worked in for the Government and for industry to show you what this type of group can do, for example, we have done work for various industrial concerns on very practical problems like boiled water problems, engine heat transfer, and so forth. We are working

for the Office of Saline Water on electrodialysis technique; we are working for the Chemical Corps on the removal of chemical warfare agents from water. We did work for the Engineers on removal of radioactive material from water. We are doing work for NASA, as you will recall. In the Gemini flight there were all sorts of water problems and the water that was produced was not potable or drinkable.

The same system will be used on the biosatellite, and we have developed a technique which will make that water usable by the monkeys that will be in the biosatellite.

We are working on the Apollo program on a corrosion problem which they have in the Apollo heat exchanger. Together with Michigan we are organizing the Great Lakes Research Conference next month.

We are working for various petroleum companies on their water problems. We have written books in the area of water, and handbooks. For example, I have a book on air and water pollution that will be coming out in a few months, which will be designed for the layman to understand some of the practical problems and what can and should be done about them.

For these reasons, gentlemen, I urge you to approve the bills before you so that our experts in water technology—regardless of whether they are affiliated with universities, research institutes or industry—can pitch in and devote their abilities to the solution of one of our most pressing problems—sufficient pure water.

Thank you, sir.

Mr. BARING. Thank you for a very interesting presentation, Doctor. The gentleman from Idaho.

Mr. WHITE of Idaho. I am very much impressed by your testimony with respect to your activities in so many various areas. I do wonder a little bit about bringing in osmosis into these particular hearings with respect to water resources research. We have the Office of Saline Water that is working in this area.

Mr. BREGMAN. May I speak to that, sir?

Mr. WHITE of Idaho. Yes.

Mr. BREGMAN. The Office of Saline Water is sponsoring work on osmosis for the conversion of saline water to fresh water, of brackish water to fresh water. Now a similar technique with different membranes can be developed for removing pollutants from brackish water, for problems such as the acid-mine waste and other contaminants. But the membranes will not be the same. As a matter of fact I feel—

Mr. WHITE of Idaho. I would like to ask you a question.

Mr. BREGMAN. Yes.

Mr. WHITE of Idaho. You seem to be very knowledgeable in this area. Just what do you think this particular area holds for this possibility? We are told many things here in this committee by the Office of Saline Water Research as to what they envision may be accomplished. I am sure if the chairman was here, he would delve into this at depth with you with respect to the prognosis that one might anticipate as far as osmosis separation, in terms of quantities, quality, and cost. What do you see at the present time in this area?

Mr. BREGMAN. Sir, it is my opinion that the reverse osmosis technique is potentially the most promising one for conversion of saline

water to fresh water, and primarily brackish water to fresh water. It is my belief that the costs will be down in the range that everyone is hoping for, the 40 to 50 cents per thousand gallon range.

It is also my firm belief that this will not be accomplished overnight. A great deal of work needs to be done on developing new and better membranes, and it is my fear, gentlemen, and my very strong fear, that as soon as any membrane at all looks practical, the emphasis will all be put on engineering, on building large-scale units with inadequate membranes: You will have units that will function in a so-so manner, rather than waiting for membranes to be developed which will do the job, and then build the hardware for them.

Too often in Government programs the emphasis is on hardware built around whatever inadequate system there may be, and not enough emphasis, in my opinion, sir, is on developing an adequate system and then hardware. I will give you a rather ludicrous example, but one on which the Government has spent a great deal of money, which involves, I think, a solution by membranes in another area.

In the space program, for example, I say ludicrous. One of the problems involved in connection with supply water for man when he is going to the moon and beyond is the re-use of water, and, specifically, recovery of water from urine. The Government has spent several millions of dollars on developing hardware. It must weigh so many pounds and it must use so much electricity and so forth, and the net result is that with all the hardware we still do not have a system which recovers enough water from urine. I think that this can be done by membrane techniques, by osmosis techniques, and I think the emphasis should be on developing the techniques. Then worry about the hardware, once you have the correct system.

Mr. WHITE of Idaho. I share your beliefs, but also we get to the point where we must do something in certain areas, and we have to use the best knowledge that we have available at that time. Hopefully, it can be improved, and this has the history of almost any scientific development.

Mr. BREGMAN. Yes, sir; I appreciate that, and I may add I think in regard to this particular bill, titles I and II complement each other in this way. In title I we are building for long-range purposes a talented corps of water technologists, and this is desirable. In title II we have technologists available today who can go to work on the immediate programs which may show results in a year or two or so, immediate results. I think these two supplement each other. I do not believe they conflict.

Mr. WHITE of Idaho. In other words, you put one in the basic research area and one in the applied research area.

Mr. BREGMAN. Yes, sir; I would.

Mr. WHITE of Idaho. I have no further questions, Mr. Chairman.

Mr. BARING. Mr. Skubitz.

Mr. SKUBITZ. No questions.

Mr. BARING. Mr. Roncalio.

Mr. RONCALIO. No questions.

Mr. BARING. Mr. White.

Mr. WHITE of Texas. No questions.

Mr. BARING. Our next witness is Prof. Harry Gregor, professor of physical chemistry, Polytechnic Institute.

STATEMENT OF H. P. GREGOR, PROFESSOR OF PHYSICAL CHEMISTRY, THE POLYTECHNIC INSTITUTE OF BROOKLYN, BROOKLYN, N.Y.

Mr. GREGOR. Thank you, Mr. Chairman.

I would like to have permission to submit this prepared testimony and when I depart from it I will ask permission to have that inserted

Mr. BARING. Without objection, it is so ordered.

Mr. GREGOR. Thank you.

My name is Harry P. Gregor, professor of physical chemistry at the Polytechnic Institute of Brooklyn. My own field of specialization is concerned largely with membranes and membrane processes. Membrane processes include electrodialysis and reverse osmosis, and are of particular interest to those concerned with water resources because they are capable of removing salts and other impurities present at a remarkably low power cost, considerably lower than for the more conventional processes.

That is why they have this enormous advantage. This interest is now reflected in a large number of current technical reports on membranes and membrane processes. I remember that 25 years ago, I think there were six requests for reprints over a period of years, when we reported the first preparation of ion-exchange membranes, our work was of interest to but a few laboratories in the world.

In view of the extensive federally supported research and development programs on water resources, members of this committee may wonder why the State water resources centers already established are not adequate. I think that there are two cogent reasons why the present legislation is needed. First, we need new ideas. We often call the development of a new concept a "breakthrough," but I wish that word were not used. This is, I think, a real misnomer. I have been involved in a few breakthroughs. I have seen several developed and they always develop in a very slow manner, and breakthrough seems to be quite a misnomer.

At any rate, these new ideas do not usually arise as a consequence of a local problem or as a result of availability of local funding. For example, the original ion-exchange membranes for electrodialysis were prepared in Minnesota, in a region and at a time when desalination was of no concern. Similarly, Professor Reid of the University of Florida, who first showed that cellulose acetate membranes could lead to a practical reverse osmosis process, could not have been stimulated by a local problem. Creative scientists and engineers usually have strong, specialized interests and do not generate new ideas on demand. All of this means that any new ideas which will make the difference between practicality and impracticality will come from active research men, wherever they are in the country.

A very large part of research in our country is performed at private universities such as the Polytechnical Institute. This is particularly true in New York State. The implementation of bill H.R. 3606 and its accompanying legislation will thus allow the Water Resources Research Department to take advantage of ideas and men which may otherwise be lost to their program.

Also, one could ask why all the institutions in a given State cannot obtain their funding through the central research center. However,

each center has its own program, and naturally favors research directed toward specific problem areas. The charter of the water resource program is quite broad, and a center primarily interested in hydrology might not give a high priority to a program dealing with a specific chemical technique for water renovation, even an outstanding one. In New York State and in certain other States where there are many private universities, the problem is particularly difficult because all proposals must come through one center. I am in communication with the center at Cornell University, and both of us want to cooperate. However, the distances are so great and our interests are so divergent that cooperation on technical problems is almost impossible. Also, since funds to any one center are necessarily limited, this places a real limitation on what any individual State research center will be able to fund.

The technical problems of our water resources are many and different. For example, in our own laboratories we are working on systems which we believe will greatly reduce the amount of irrigation water now required. As you know, a major part of the water consumed in the United States today goes for irrigation. In New York State we do not irrigate, and our State resources center is not likely to support our work as a center in an arid region of the United States. If we could develop techniques for reducing the amount of water needed for irrigation in California, for example, it would make possible a reduction in California's need for water originating in other States.

I would also like to draw to the attention of this committee the fact that this bill supports the principle of multiplicity of support. This means that a scientist or engineer with an original idea will have yet another agency with a broad charter from whom he can obtain support. I have been involved with the direction of federally supported research projects for 20 years now, and I am very much concerned in the recent move to have Federal funds be more equally distributed on a geographical basis and to allocate them in the form of institutional grants rather than ones directed toward a given research scientist. The problem has been stated excellently in a recent editorial in the New York Times of January 26, 1966, where it has been pointed out that an eminent Soviet physicist acknowledged the greater efficiency of American research compared to Soviet research, and attributed it to the wiser American technique of distributing funds for research and development on the basis of the quality of the man and the merit of his proposal rather than by allocating funds to the institution for distribution by the administrative officers there. The editorial points out that we are now tending in the direction of repeating the Soviet error. Obviously we need a proper geographical balance as our country develops, and institutional grants have their place. I just want to emphasize my desire that individual grants based on individual merit not suffer.

I would like to depart from the text here. I spent part of last summer on a series of lectures and meetings in Eastern Europe, and I spoke with many scientists in Eastern Europe, particularly the Soviet Union, and many of them said, "How do you get your money?" And when I explained the system to them, I think every one of them were envious, because every one of them operate under institutional grants, and it sort of trickles down to the man doing the research.

I don't think any of them were willing to go so far as to admit the advantages of free enterprise, but they certainly felt there is a definite disadvantage in having to depend entirely upon institutional grants.

In the past, most research funds have been given to the institutions in the name of an investigator who had an idea, has made a proposal to one or more Government agencies, and convinced them of the merit of his proposals and his own competence. This system places a premium upon enterprise, and its success is manifest everywhere. It is true that a few individuals have excelled in what is known in the academic community as "grantsmanship" and have sometimes received a disproportionate share of research dollars, but they are the exception, I think, and the system itself has been overwhelmingly successful.

In the system as it now exists, there are usually enough agencies funding research in a given area so an enterprising investigator, if he fails to convince one group can approach others with success. This multiplicity of research sources has been a great factor in our success. I can easily understand why from a purely administrative point of view institutional grants are much to be preferred. It is quite true that there will be more direct accountability, less problems with complex bookkeeping, and the like. I am sure also that the Government will receive all of its reports with their proper format, with correct covers and on time.

Mr. RONCALIO. Including spelling?

Mr. GREGOR. Including spelling. I can't spell. I speak of this latter matter with some bitterness because I am myself notoriously delinquent when it comes to periodic reports, unless someone really twists my arm.

But what of the content of these reports? Will the Government get better value from studies which, to a certain extent, will come to be assigned by an administrator? Many funding agencies have staff members who know many of the questions for which we need answers.

They might not know the answers, of course.

Will they be able to communicate with research men through an administrative layer? What of the interest of the researcher in seeing that he gives value received for his project. I am convinced that a study of institutional grants versus individual grants will show that the individual grant is many times more efficient in terms of value received per research dollar.

To summarize, the Office of Water Resources Research should, in my opinion, be given the latitude to seek out and support good ideas wherever they occur. The problems of renovating our contaminated water resource and of developing new techniques to prevent repollution, particularly by helping individual plants control their effluents, are far from solved. I am quite aware that one can read almost every day of processes which will convert even sea water into usable water at a cost comparable to what we pay in many large cities. I have seen many of these estimates, and have observed that the less the information available on the process, the lower the estimate; as information is developed, projected costs invariably rise. When a responsible, private company, free of subsidy, bids upon a given water renovation process and guarantees a given cost figure, then we will know what the costs are.

I want to thank this committee for the opportunity of presenting my views.

Mr. BARING. Thank you, Dr. Gregor.

The chairman of the full committee, Mr. Aspinall?

The CHAIRMAN. Mr. Chairman, I have no questions.

I followed through on the statement as best I could, having come in late for this witness. I want to thank Dr. Gregor for being willing to take the time to come down here and make this presentation.

Mr. BARING. Mr. Skubitz?

Mr. SKUBITZ. No questions.

Mr. BARING. Mr. Roncalio?

Mr. RONCALIO. One very short question, thank you, Mr. Chairman.

On page 3 you commented on the fact that in your laboratory at Minnesota you are working on what you believe will greatly reduce the amount of irrigation water now required. As a Congressman representing an arid State may I say amen and good luck to you in your work.

Mr. GREGOR. Thank you.

Mr. BARING. Mr. White?

Mr. WHITE of Texas. I was curious about this, since I come from an irrigation area—are you in a position to say what type of assistance could this be where you could use less water for irrigation?

Mr. GREGOR. Yes; I would be glad to. Usually much of the irrigation water used in the Far West or in Texas and in other areas is rather salty to begin with. The 1,000 parts per million water is frequently used for irrigation, and this means, of course, when the water is put on the ground, a good deal of it seeps into the subsoil, a good deal of it is evaporated and it leaves a salty crust in the surface of the ground. Of course this concentrated salt is toxic on the plants, so, you always have to overirrigate. You always have to keep washing the salt down the subsoil, because it is not volatile and it must be washed down.

Now, usually irrigation practices vary, of course, but sometimes you have to use two or three times as much water to overirrigate. If you took this 1,000 parts per million water and reduced it down to a few parts per million, and this is not that difficult a problem, then you wouldn't have to overirrigate. Immediately you save this large amount of water.

Mr. RONCALIO. You would clean up the alkaline situation then in your drainage, too.

Mr. GREGOR. That is right. It solves several problems simultaneously, and, of course, it reduces the total water requirement for irrigation.

Mr. RONCALIO. Thank you very much.

Mr. BARING. Thank you very much, Doctor. We certainly appreciate your testimony.

The subcommittee will stand in recess until 2:30 this afternoon.

(Whereupon, at 11:45 a.m., the subcommittee recessed, to reconvene at 2:30 p.m., the same day.)

AFTERNOON SESSION

Mr. WHITE of Idaho. The Subcommittee on Irrigation and Reclamation will come to order for the further hearing of testimony on H.R. 3606.

We have first on the schedule for this afternoon Mr. Omer J. Kelley, manager, Agricultural Research Center, Stanford Research Institute.

Mr. Kelley, will you come forward?

STATEMENT OF OMER J. KELLEY, DIRECTOR, AGRICULTURAL RESEARCH CENTER OF THE STANFORD RESEARCH INSTITUTE

Mr. KELLEY. Mr. Chairman.

Mr. WHITE of Idaho. Mr. Kelley, we are pleased to have you before the committee and we look forward to hearing your testimony.

I will have to apologize that some of my colleagues are not here. I hope that you realize, of course, your remarks will be in the record on this particular legislation, and I am sure will be reviewed by all of the members.

Mr. KELLEY. Thank you.

Mr. WHITE of Idaho. You may proceed.

Mr. KELLEY. Thank you, Mr. Chairman. It is a pleasure for me to be able to be here and to discuss with you this legislation.

I am Omer J. Kelley, director of the Agricultural Research Center for Stanford Research Institute. Today you might say I am representing two groups, as I am also a member of the Water Research Council, which Mr. Bregman mentioned to you earlier today.

Stanford Research Institute, as you may know, is what is known as a not-for-profit research organization; we are non-tax-supported and nonendowed. We do research for governments, companies, and individuals, and they pay for the research on a project-to-project basis. We have in excess of 3,000 people on our staff. Last year our volume of research exceeded \$50 million. As you can see, we are a sizable research organization.

The Water Resource Research Act passed by the 88th Congress was a step in the right direction and the Congress is to be commended for this action. As good as it is, however, it still does not go far enough. The present H.R. 3606 and similar bills are excellent and, if passed, will provide the needed legislation for a complete water resource research program.

I come from the western part of the United States where the water needs are already overtaking most of the available water supply. Obviously, however, the West is not alone with respect to water problems today. Water problems exist throughout the United States. That these problems are extremely important and are becoming more critical every day has been clearly documented many times.

Your committee has been one of the most active groups in the United States to so recognize and document these problems.

The National Water Research Symposium, which was held in Washington, D.C., in 1961, and was supported by the National Association of Soil Conservation Districts and the National Reclamation Association, also did an outstanding job in identifying and bringing research needs up to date in this important field. I, therefore, feel that there is no need to attempt to list the many water problems to a well-informed group such as yourselves. Rather, I should like to mention a few specific present problems and discuss the tremendous opportunities that exist for solving the water problems throughout this country, and some of the steps that need to be taken to bring about the solutions.

We recognize that one of the most important problems facing our society today and for many years to come is the preservation, conservation, allocation, management, and utilization of our water resources in the most optimal manner possible. Because of the wide and varied uses of our water resources, many organizations, both Government and private, are involved—each has its own responsibilities, objectives, and problems in carrying out its mission in the field. However, if we as a Nation are going to meet all the needs and requirements related to water resources we cannot treat the many responsibilities, objectives, and problems separately—all conditions and factors must be considered in a total integrated context—planning at local, regional, national, and international levels must be on a coordinated and integrated basis and the implementation of these plans must be carried out accordingly, and above everything else we must achieve as real optimal results in all phases and aspects in our endeavors as possible.

Growing competition for water use has pointed up the vital needs for theoretical and applied systems, optimization and analysis, and both planning and real time operational management of water systems specifically. Our investigations, for example, point to the need for systems analyses aimed at optimizing multiple reservoirs operations, taking into account power generation, flood control, fish and wildlife, recreation, water quality factors, and optimal water allocation for agricultural, industrial, and domestic consumption, also the need to extend the solutions to planning and operations of river basin, run of the river, aqueduct, and pumped storage systems. The solution to the multiple reservoir problems and its future extends to the other types of situations, carries with it an economic investigation of inestimable magnitude. Such analyses must provide optimal solutions as well as the alternatives available, but cost benefit functions involve technical solutions to establish management criteria and principle to guide our lawmakers in modifications of the legal structure covering water resources, factual information related to establishing terrification policy and sensitivity of the many factors and parameters involved in setting the total required performance criteria of our water resource system. Another and important need is concerned with our obligation to apply the results of research already carried out by the Government that has direct applicability to the solution of water resource problems.

I might comment here on a specific water problem we have been working on here at the institute.

This is relatively small but important. A company came to us—with a boron problem in water which they wanted to put back into the underground aquifer. The amount of boron was not very great in parts per million, but it was sufficient to be detrimental to plant growth. This problem has finally been solved by an organic synthesis chemist, a person one would not ordinarily expect to be working in the waterfield, a man who knows probably little, if anything, about water, certainly nothing about hydrology or plants. But he does know something about organic chemistry and he has synthesized a chelating agent, which is a new agent that will take the boron out of the water, and this is in trace amounts.

I just point this out because I think it shows an example of bringing in other disciplines which one would not normally expect in this kind of research.

Let us consider a problem that has always been of particular interest to me, that is the loss of water through evaporation from soil surfaces. If we take the State of Arizona, for example—this would apply to a lot of the Western States—about 80 million acre-feet of water falls every year in the State of Arizona. If one tries to account for this in terms of underground accretions of streamflow, one can only account for about 5 or 6 million acre-feet. What happens to the rest of it? The remainder of this water is lost either through evaporation from the soil surfaces or through evapotranspiration from nonbeneficial plant growth. Here is an area where very little research is being done today. Practically nothing.

If one could find a way of preventing, say, the soil surface from taking in the water and then collect this water runoff, this would be a tremendous source of water.

If one is to collect this water by runoff, there are three or four things necessary.

First the soil must be made impervious to water; secondly, plant growth must be prevented; third, the land must be stabilized so it will not erode. These three problems offer a straightforward solution in a particular situation. Today we know we can make soil impervious to water very easily. This is no problem and can be done without much cost. We can keep the plants from growing. We certainly do not, however, know how to prevent land erosion when we take off the plant growth.

Mr. WHITE of Idaho. Might I interrupt you there?

Mr. KELLEY. Yes, sir.

Mr. WHITE of Idaho. In the previous sentence you said: "These three problems offer a straightforward solution in a particular situation."

Mr. KELLEY. Solution is what I should have said in a straightforward situation.

I point this out because it is important in finding ways of saving such water. Research of this type will require physiologists, chemists, biologists, engineers, and economists.

There is a role which must be filled if we are to derive the maximum benefit from our total efforts in water resource research. This role is one that does not appear to be filled completely at present by any organization and particularly any organization in the Far West. The role is difficult in that it requires an organization with an extremely broad depth in experience and capacity; one which can provide the understanding of the results of theoretical research as it applies to water resource problems; one which can understand in detail the real water problems involved; and one which can couple the results of research to these problems and carry the effort through applications to operations solutions in the field.

It is difficult and costly to assemble, develop, and provide a highly experienced, diversified staff of scientists all under one management who can fulfill these requirements. The water resource problems are so vital and critical to our present and future growth and advancement, and of such magnitude and complexity, that we dare not overlook any solution of water resource problems. However, to take full advantage of the Nation's source of scientific and engineering talents requires activation and implementation of H.R. 3606, or similar legis-

lation, in order that the Department of Interior's Water Resource Research Office can provide leadership to the fullest measure possible.

Full-time research staffs are required to combine in a timely manner the recent advances of modern technology with the broad base of experience that now exists in the design and operating agencies by virtue of many years of working with water resource facilities. Our staff has been effectively combining its talents in optimization analyses with engineering personnel experienced in the planning and operation of large electric power systems and we feel that similar potential exists in the area of water resources.

There are two important aspects of scientific research on any problem. One is the advancement of the sciences needed for the solution of the problem and the other is research oriented to a solution of the problem using the level of scientific knowledge available in the required sciences.

The private research institutions are generally more oriented to problem solving than public agencies, and they have a greater capacity to bring a multidisciplinary approach to the solution of any given problem.

The tax-supported research institutes are generally more oriented to research designed to advance knowledge in a given discipline, and these advances can then be put together for problem solving. The point I wish to make is that both approaches are important and necessary, and the bill that we are discussing today would make it possible for both approaches to be used to the fullest extent.

It is our belief that the program envisioned by these bills will be extremely efficient and in the best interest of the taxpayers. It is designed to require a minimum number of Federal employees and to use facilities that are already in existence in State and private institutions.

The research will all be done by contract or grants and, hence, can take full advantage of centers of excellence for any given phase of the research problem.

Scientists of outstanding caliber can be made available through this approach. A scientist will not have to be at a given location or a specific Federal laboratory for his services to be used. Another very important feature of this type of research is that nonproductive efforts can be quickly terminated and new and important problems studied as they arise.

The program envisioned in this legislation has long been needed.

Mr. WHITE of Idaho. Thank you very much, Mr. Kelley, for a very interesting presentation. I am very much impressed by the size of your organization and the manner in which it is financed. I understand from your testimony that in volume last year you had in excess of \$50 million in research programs.

Mr. KELLEY. This is correct, yes.

Mr. WHITE of Idaho. This was all paid from what sector?

Mr. KELLEY. Our total volume of research is in excess of \$50 million last year, and this is financed by our clients, which include the Federal Government, State governments, some foreign work, and by business and individuals who come to us or we go to them with projects that are eventually worked into a specific proposal that is agreed upon and then paid for on that basis.

Mr. WHITE of Idaho. What would be the difference between the private and public sector?

Mr. KELLEY. Unfortunately, from our standpoint more than half of our work is in the public sector. I would say a little over 60 percent is in the public, and in the high 30's in the private.

Mr. WHITE of Idaho. I had a question about a word that you used here on page 3 of your testimony, the next to the last line, you referred to "factual information relating to establishing terrification policy."

Will you explain to me what terrification policy is?

Mr. KELLEY. We are referring there to establishing pricing policy involving a whole array of different types of benefits that can be had or spread over a wide group of different industries or people. How do I price, for instance, electricity that is coming from a power dam that has a multiple use, or for water, this sort of thing.

Mr. WHITE of Idaho. Stratification, is that what you would say?

Mr. KELLEY. Stratification, that would be fine, yes.

Mr. WHITE of Idaho. On page 4 of your testimony you say "another and important need is concerned with our obligation to apply the results of research already carried out by the Government. That has direct applicability to the solution of water resource problem."

Are you suggesting that you would go into the research areas or the fund of research that is available from certain governmental agencies and carry this forth?

Mr. KELLEY. I think what we are suggesting here that it would not necessarily be limited to research done by the Government. But one of the things we find true in our day-to-day research, and certainly it is true in this overall area of water, is that research conducted on a given problem or for a given industry may have fallouts that affect other types of solutions to other problems. There is no question in the water field but what there is a lot of information available that could be directly applied without too much additional research, but it does take people to bring this together and to evaluate it and put it on the problems where they will apply. This is the kind of thing I am referring to here.

Mr. WHITE of Idaho. I think probably the most interesting aspect of your testimony here, is controlling the evaporation from soil surfaces. I am wondering what you might get into in the area of preventing evaporation from soil surfaces in one part of the United States that might change the precipitation in another part of the United States. We have already had some beginnings of legal questions in this area with respect to seedings of clouds.

I am much impressed by what you say here, but I think it is a complicated thing and I think we will have a good many problems in the legal area as well.

Mr. KELLEY. I would say this kind of research and the application of it would very definitely have some legal problems. It would have some sociological problems also.

The thing we are talking about here is in areas where land is more valuable than water, and this is particularly true in certain desert areas of the country. One could cover or treat portions of this land so that there would be no plant growth, and then all the water that fell would run off.

Now, I can see that there could be opposition from a visual standpoint.

On the other hand, this might be treated in such a manner that it would not be visible unless you flew over it. But I don't think that this kind of treatment, in any magnitude that I can foresee, would affect precipitation in other areas.

I might mention that research has been done along this line, I believe, financed by Standard of New Jersey in certain eastern countries. They have tried to treat landscapes with petroleum products, in order to get a certain heating effect that would cause a rise of the clouds to cause precipitation. This is a little different from what I am talking about here, but that is the only place where I can see that it would have much effect on precipitation.

Mr. WHITE of Idaho. I think there is one place where you could start right away is in some of the areas where they have phreatophytes that take great amounts of water out of the channel banks.

Mr. KELLEY. Right.

Mr. WHITE of Idaho. One last question. You endorse this particular legislation and you indicate that you think it will do a great deal. I feel that we dare not overlook any solution of water resource problems, but even this particular program that we are talking about will not be able to cover the areas that you are suggesting in your testimony.

Mr. KELLEY. Right.

Mr. WHITE of Idaho. You realize this, of course.

Mr. KELLEY. Yes. I think it would be a good step in the right direction.

Mr. WHITE of Idaho. I have no further questions.

Mr. Skubitz?

Mr. SKUBITZ. Mr. Kelley, I was interested in your statement on page 1. Several witnesses have made similar statements:

The Water Resource Research Act passed by the 88th Congress was a step in the right direction, and the Congress is to be commended for this action. As good as it is, however, it still does not go far enough. The present H.R. 3606 and similar bills are excellent, and, if passed, will provide the needed legislation for a complete water resources research program.

What is there in this bill that "does not go far enough" outside of a lot of additional money?

Mr. KELLEY. In my judgment the earlier legislation referred to here, by virtue of the restriction of the projects having to go back to the two committees, has, in effect prevented the administration from requesting any funds for title II.

Mr. SKUBITZ. Do you think that this committee should authorize funds and then divest itself of the responsibility of looking over projects to see if they are meritorious?

Mr. KELLEY. I think by all means that the committee should look into them and follow them up.

Mr. SKUBITZ. This is all we intended to do under the original act.

Mr. KELLEY. It appears that the way that it was done has prevented the administration from asking for money under title II. I think this legislation—

Mr. SKUBITZ. Well, this is an argument between the executive and the legislative branch, the issue being on whether we are trespassing on its prerogatives or whether we are surrendering one of our rights.

I am of the school that just thinks whenever the legislative branch of government authorizes a piece of legislation, it has a responsibility to see to it that it is carried out properly.

Mr. KELLEY. Of course, I am not qualified to answer how you do it. I would agree that you do have a responsibility to keep abreast of what is going on, and how the money is being spent, and I would think that in your annual appropriation hearings some of this would come forth.

Mr. SKUBITZ. Once this gets out of the authorization group over into the appropriation group, we have lost our control. That is why we have been insisting that proposals come back to the legislative group.

That is all, Mr. Chairman.

Mr. WHITE of Idaho. The gentleman from Wyoming.

Mr. RONCALIO. I have no questions.

I am grateful to you for the statement. I have followed most of it and I will read the rest.

Mr. WHITE of Idaho. Mr. McFarland?

Mr. McFARLAND. I am wondering what is the relationship between Stanford University and your organization.

Mr. KELLEY. The only relationship is that they own us.

Mr. McFARLAND. They own you?

Mr. KELLEY. They own us. We have a separate board of trustees. The president of Stanford is the chairman of our executive committee ex officio, but we operate as a separate corporation from the university, but they do own us.

Mr. McFARLAND. With respect to Mr. White's question, what portion of your work is by contract with the Department of Agriculture?

Mr. KELLEY. With the Department of Agriculture?

Mr. McFARLAND. Yes.

Mr. KELLEY. A very small amount.

Mr. McFARLAND. A very small amount?

Mr. KELLEY. We do work with the regional and various operating divisions, but in total it is not very great.

Mr. McFARLAND. Mr. Chairman, I notice that Dr. Kelley was a member of the panel that reviewed the program of the Office of Water Resources Research.

Mr. KELLEY. That is correct.

Mr. McFARLAND. And I was interested in the statement—

The panel believes that the Office of Water Resources Research should now develop as a matter of high priority the additional criteria it would use in identifying the kinds of research fostered.

Do I understand that you think they should set out certain priorities with respect to the type of research which these institutes and organizations and others should conduct and then use this as a guide in considering projects?

Mr. KELLEY. Well, I think that obviously they get so many requests that they do have to have guidelines and guide materials. They have some, and our committee was referring to possibly more details along this particular line.

Mr. McFARLAND. In your review of the program, do you personally feel that they are off to a good start?

Mr. KELLEY. I think they are off to an excellent start. I would say the committee, without exception, was very well pleased with the work that had been done to date, and I would say we were surprised. We think that it was all above what one would normally expect in such a short period of time. I think they are to be complimented on what they have done to date.

Mr. WHITE of Idaho. In line with the same questioning, do you feel that there are areas that should have been approached—do you feel that there were areas that should have been approached that have not been approached, other than the broad spectrum that you alluded to in your statement? Do you feel that there were any immediately obvious deficiencies in the program?

Mr. KELLEY. I think it is a little difficult to answer that question, because I would have to say "Yes," there are many. I just don't think they have had the time or the funds to cover the kinds of programs that they eventually will cover with time, money, and authorization.

But I think they have done a good job.

Now, one can think of a number of areas where we do need research badly. Take the whole area of water law. We need an increase in this area. Take the area of evaporation from soil surfaces which I mentioned. This needs to be expanded. I don't believe that they have a project in this latter area at all. I know they have some that have been submitted. To answer your question I would say that there are a number of areas which they will get into, but haven't been able to as yet.

At least I hope they will get into these areas.

Mr. WHITE of Idaho. Their initial coverage of the field is quite good; would you say?

Mr. KELLEY. I think it is as good or better than one would expect with the money they have had and the time they have had to do it.

It is not as good as I would like to see, but I think it is as good as one could expect.

Mr. WHITE. Another problem we run into here in this committee often is the evaporation from water surfaces.

Mr. KELLEY. Right.

Mr. WHITE of Idaho. And leakage from irrigation ditches.

Mr. KELLEY. Right.

Mr. WHITE of Idaho. And transportation systems of water, and I think these are problems that could stand immediate research.

Mr. KELLEY. A tremendous need, yes.

Mr. WHITE of Idaho. Before we get into some of these other areas.

Mr. KELLEY. Right.

Mr. WHITE of Idaho. I want to thank you for your testimony and for its excellent presentation.

Mr. KELLEY. Thank you very much.

Mr. WHITE of Idaho. The next witness is Mr. Gordon K. Zimmerman, executive secretary, National Association of Soil & Water Conservation Districts.

We will be glad to hear from you, Mr. Zimmerman.

Mr. Zimmerman, we want to welcome you before the committee and look forward to hearing your testimony.

**STATEMENT OF GORDON K. ZIMMERMAN, EXECUTIVE SECRETARY,
NATIONAL ASSOCIATION OF SOIL & WATER CONSERVATION DIS-
TRICTS**

Mr. ZIMMERMAN. Mr. Chairman and members of the committee, I come here not as a research expert, as some of the witnesses have before, but on behalf of some of the users of research information in water. The 3,000 soil and water conservation districts of the country are legal subdivisions of the State with responsibilities for developing and encouraging the adoption of soil and water conservation programs and resource development programs within their boundaries.

The programs of these districts depend heavily upon the assistance they receive from technicians of State and Federal agencies, private sources of assistance; the quality of the programs of resource development that are developed and put into operation depend very heavily upon the quality of the information which is available. We are moving at such a rate of speed these days in the development of these programs that district leaders across the country are almost unanimously anxious to have available to them the best possible research, the best possible water information that can be developed and devised to be put in the hands of the technicians who help.

It is our view that the Water Resources Research Act of 1964 authorized a valuable and necessary program. It has opened the door for substantial progress in fundamental and practical research into the water problems of the Nation. This action was most timely, because the events of last year, ranging from the floods in the West to the drought in the East, demonstrate the growing need to learn more than we now know about the ways to conserve, develop, and manage wisely our available water resources.

The National Association of Soil & Water Conservation Districts supported the Water Resources Research Act when it was originally introduced. Our 3,000-member conservation districts—functioning in every State—are vitally interested in water research. They are interested because they are directly engaged in programs of water conservation and development on the lands of over 2 million cooperating landowners, and in connection with over a thousand upstream watershed protection and flood prevention programs.

We are encouraged by the speed with which 51 water research institutes have been established at land-grant universities under Public Law 88-379. We applaud the vigor with which the Office of Water Resources Research of the Department of the Interior is prosecuting its responsibilities under this law.

In our opinion, however, the program is moving along only at half power because the act, as finally adopted, does not give sufficient emphasis to the conduct of water research by universities, foundations, and other institutions not associated with the land-grant universities.

At our annual convention in Portland, Oreg., last year, and again at our 20th annual convention last week in New Orleans, the NACD affirmed its support of S. 22 and companion bills and the expansion

of the research program to enlist all centers of competence in this work. We believe there are good reasons for such expansion:

First, there is growing concern about the effects of population growth, industrial development, and urban expansion on water use, water quality, and water management. In view of this concern, which we regard as a valid one, the Nation cannot afford to restrict its research efforts to a limited group of agencies.

Second, breadth and balance are needed in the research program. I would interject here that from what we have been able to determine about the bulk of the project applications that are coming in, they relate preponderantly to the physical aspects of the water problem, and as many of the witnesses have indicated earlier, there is a reluctance or the projects are being submitted by scientists and individuals who do not have a background or an interest in the governmental, in the legal and the sociological aspects of the water problem. Of course, these are fields in which we in districts are particularly concerned. We feel that investigations should be pursued with equal diligence into these aspects of the problem.

The present title II of the act we believe unnecessarily restricts the participation of a local array of especially qualified institutions in this kind of effort.

Third, if funds for this work by other than land-grant institutions are limited to \$1 million per year, the pressure to insure geographical distribution of grants almost surely will lead to inadequate financing of needed research. Small projects are likely to be emphasized at the expense of those of a more significant kind; and the funds, if this happens, will not produce the maximum benefits.

Our conviction is that the Nation can benefit greatly from the Water Resources Research Act of 1964. But the benefits will be larger, and the work of higher total quality, if the act is amended to increase funds available for expanded research by the many institutions with recognized competence—in addition to land-grant universities. We support the purposes of S. 22 and the companion bills.

I want to indicate our appreciation that we could meet with the committee and present our views on this legislation.

Mr. WHITE of Idaho. Thank you very much, Mr. Zimmerman. I am going to have to go back to the original line of questioning by the chairman of the full committee, and that is, Where do you think we stop in this area? How much money do we put into a program? Does research alone in great quantities solve every problem? We have 1,545 research programs going on now in the water area. If you put everyone in the United States with competence in this program, finance every available area, I think we would use up a good part of the budget. It worries me when people come in here and say that the only way to solve this problem is just to start appropriating funds for everybody who comes up with any kind of a project and says that this is going to solve all of the problems of water. Do you feel this way?

Mr. ZIMMERMAN. I do not think our position is that we are asking for a blank check in this matter at all.

Mr. WHITE of Idaho. You say we are going on one lung.

Mr. ZIMMERMAN. Half power.

Mr. WHITE of Idaho. Half power, one lung, one wheel, all right, but I do not think that that is really a correct analysis. I do believe that there are other areas that can be brought into this, but I do not think simply because of land grant institutions being the only ones taking a part in this program that we are not approaching it on a broader area than just half power. I realize that these other areas may have a great deal to contribute and probably should be involved in this, but I do not think that the thrust of your testimony, as I listened to you, is that more and more research is going to solve every problem. We have found that in many areas of governmental research today, and there are others in the sector that have to come forward and support certain research.

Mr. ZIMMERMAN. That is right.

Mr. WHITE of Idaho. Yet it cannot all be done by the Government, every research problem, simply because it is acute at the present time because of some recent happenings and recent realizations. The problems have existed longer than the last year or so, but because of the water shortage in the New England States last year and because of the realization that water is going to have to be brought into the arid Pacific Southwest, people are beginning to think in terms of water, and you put on top of that the pollution that is happening in the United States, this is why people are cognizant of the problems and are beginning to worry. But these problems did not develop overnight. They have been with us for some time. And just to unleash an unlimited amount of research I do not believe is going to immediately solve the problems. I think that it is going to have to be very carefully screened, who takes part in these programs, and that is the responsibility of the Department and the directors of the program.

But in your statement that you extemporized with respect to the programs, you indicated, as I understood you, that these have been of low caliber in some areas. I did not quite understand.

Mr. ZIMMERMAN. I did not mean to indicate that, sir.

Mr. WHITE of Idaho. Would you clarify that for me, please?

Mr. ZIMMERMAN. As I understand it, most of, the majority, as far as I have been able to determine, of those that have been submitted, I did not mean to indicate that they were low quality. I meant to indicate that as nearly as I can understand, they are primarily designed to study and investigate the problems of physical dimensions of the water problem, and the soil-water relationships. I did not mean to derogate the problems and the importance of this kind of research, if I did.

Mr. WHITE of Idaho. You meant there should be additional——

Mr. ZIMMERMAN. I did, sir.

Mr. WHITE of Idaho. Additional research in the basic scientific areas more than in the immediate physical problem.

Mr. ZIMMERMAN. No, sir. What we are peculiarly interested in, in districts along with the basic physical information, is research into problems of social, economic, and political aspects of the water problem. These we feel are so far in the minority of the applications for research grants.

Mr. WHITE of Idaho. And you believe that this is a function of the Office of Water Resources Research.

Mr. ZIMMERMAN. It is one of the categories that is listed by the Office of Water Resources Research.

Mr. WHITE of Idaho. You think it should be emphasized?

Mr. ZIMMERMAN. Yes, sir.

Mr. WHITE of Idaho. I have no further questions.

Mr. RONCALIO?

Mr. RONCALIO. Thank you, Mr. Chairman. I appreciate the statement and your remarks.

Mr. WHITE of Idaho. Mr. Skubitz?

Mr. SKUBITZ. Mr. Chairman, I am sorry I was not here yesterday to hear the Department's testimony on this bill. I can understand why the Department comes and wants an open end authorization rather than a 10-year limitation. I can understand why the Department wants this committee to surrender its rights to look over their shoulders and review its work. But it worries me when this witness and the witnesses who testified this morning come down here and, in order to get an appropriation, they urge us to surrender our legislative responsibility to review the grants proposed by the Department. This I do not understand.

Mr. WHITE of Idaho. We are really getting into a constitutional problem here with the divisions of the branches of the Government, and the President has made it clear that he signed the bill with some objections, and this is probably the reason that it has not been implemented.

Mr. SKUBITZ. This may be true, Mr. Chairman, but it seems to me that the witnesses are coming before us and saying, "All we are interested in is the money and not the principle involved."

Mr. WHITE of Idaho. Thank you very much for your very excellent statement. I have a real interest in the soil conservation section and—

Mr. ZIMMERMAN. Thank you.

Mr. SKUBITZ. Mr. Chairman, I do, too, but I just do not like this sort of thing.

Mr. WHITE of Idaho. The next witness is Dr. Wingate Lambertson, manager, Physical Sciences Division, Spindletop Research Center.

We are happy to have you before the committee, Mr. Lambertson.

STATEMENT OF DR. WINGATE LAMBERTSON, MANAGER, PHYSICAL SCIENCES DIVISION, SPINDLETOP RESEARCH CENTER

Mr. LAMBERTSON. Thank you, Mr. Chairman. I appreciate your permitting me to testify.

Mr. WHITE of Idaho. You may proceed.

Mr. LAMBERTSON. My name is Wingate Lambertson. I come to you as a private citizen interested in the preservation and development of our water resources and as a representative of an applied research organization interested in the application of our talents to water problems which are becoming increasingly significant to industry, to government, and to every citizen.

Every member of my family is a water sports enthusiast. We were delighted when we moved to Kentucky where we could enjoy the long boating season and the beautiful rivers and lakes. Water skiing, boating, and swimming occupy us every free weekend of the summer. The palisades of the Kentucky River in the different seasons of the year

are as beautiful natural scenery as I have seen anywhere. As a boating fan, I have also been honored by the Kentucky Department of Natural Resources by being commissioned an admiral in the Kentucky navy.

As an aside, I believe I am the only admiral you have testifying on this.

Tremendous strides have been made in Kentucky in the construction of sewage treatment plants; the major amount of waste from urban communities is now treated. However, it disturbed me to learn that the headwaters of the beautiful Kentucky River lie in an area having the highest incidence of tuberculosis in the country, and that people in small rural communities on its tributaries drink and use polluted water. I hope that the new health and development programs being undertaken in Appalachia and the new reservoirs being installed on the upper Kentucky River will make this area just as nice a place to boat and swim as some of our lakes. Those of you who are boating enthusiasts will know my personal feelings about water quality improvement. Now I would like to make a statement on behalf of the not-for-profit research firms serving our Nation.

Spindletop Research is the 11th of the not-for-profit research institutes to be formed and the first to receive its initial financing entirely from State funds.

In addition to this written testimony, I would like to make a few more comments.

Mr. WHITE of Idaho. If you will so inform the reporter when you are doing it, without obligation it is so ordered.

Mr. LAMBERTSON. All right. The committee may be interested in the fact that Kentucky was the first State to use State funds to form a not-for-profit research organization. This was an interest on the part of the Government and leaders of the Commonwealth to make it possible to use its money for applied research, to service industry, to service the State government, to service the region.

Going back to my text, its purposes and objectives include accelerating " * * * as rapidly as possible the development of Kentucky's resources." Most of our work is of an applied research nature. As manager of the physical sciences division, I am concerned primarily with the laboratory part of our activities in the application of basic knowledge to practical industrial problems.

Spindletop's applied research activities have been international in scope. However, emphasis has been upon the region where we live. We maintain a staff having many of the skills needed for dealing with, and developing an understanding of, the complex problems of Kentucky and the surrounding region. In the field of water research, most of our activities have involved creating useful products from wastes that presently are sources of pollution and developing concepts for water planning for communities and river basins.

Some of the applied water problems which we have encountered and for which we have developed research approaches are as follows:

1. To show how a regional institute responds to a typical local problem, I offer the following example. One historic and rapidly growing community in Kentucky depends upon an underground water supply which is fed from the drainage basin of another community. Land worth more than \$30,000 an acre in the latter community cannot be

developed because it might serve as a source of pollution for the other community if septic tanks were utilized. Extensive limestone beds offer possibilities for rapid underground transmission of unoxidized and unfiltered contaminated waters which may flow for great distances. Although there are many facets to this problem, the technical question of where the water originates and the legal and other responsibilities of the communities and property owners certainly are two of the most important. This is a practical problem of an applied nature, and only a few groups are able to provide knowledgeable answers.

2. A group of our people from the physical, behavioral, economics, and systems sciences fields has devised as a decision aid a systems approach to water resource planning. Those concerned with the day-to-day problems of making decisions about water problems and water opportunities know that most of the technical data needed for these decisions is available but not in a readily usable form. The high-speed computer enables one to see graphically the effects of different individual decisions. A visual display of information is more comprehensible to the decisionmaker than tabular forms of data. The systems concept incorporates the applicable aspects of regional development programming, information systems application (as employed in air defense command and in nuclear physics), and new advancements from the behavioral sciences.

As an addition to this statement, what I am addressing myself to in that problem is the trade offs that you have to make. The governmental decisionmaker has to meet this when each local situation arises. Usually everyone cannot benefit. Someone loses and an optimum trade off has to be arrived at.

3. During our region's efforts to identify a site for the 200-billion-electron-volt proton accelerator, there were many arguments over the availability of sufficient water to meet the needs of the installation, even though reams of water data were available to us. The questions were rather simple ones. Would the required amount of water be available by a certain date, and what would be its price and quality? Quick estimates were easy to make, but hard data backed up by probabilities and detailed information on the supply and demand requirements of the total watershed system were not available to us. The basic tools for handling problems of this type have been developed for similar situations; what is needed now is the application of these techniques to provide answers at a minimum cost and delay.

This does not mean that the Federal Government should make a research contract to someone to allow it to develop the best industrial site. What I am addressing myself to here is the development of planning techniques, so that when questions arise, optimum solutions can be obtained with a minimum delay. This is not limited to one situation.

4. Other ideas taken through the conceptual stage at Spindletop include a way of converting what is now an industrial pollutant to a useful product. This, alone, could add more than \$10 million annually to Kentucky's economy.

5. The problem of waste treatment in the small rural communities now appears tractable by a newly proposed technique.

This is an idea we developed as a way of getting at the small rural communities in Appalachia. It would take advantage of the fact that

these people live in valleys, up the valleys in a rather small watershed, and we believe that we have some ideas on how to go about handling their waste so that it does not flow down the Kentucky River and we have to swim in it.

Water resource related programs in which Spindletop has participated include planning for recreation, river lands development, management of natural resources, Appalachian regional development, and compilation of a water handbook.

We have been following the development of the Water Resources Research Act and the resulting institutes over the past 3 years, and we are heartily in favor of what you are doing. Although we are specialists in the application of the scientific method to defined problems, and although this country must utilize the most creative talents available to solve urgent water problems, we have been unable to implement many of our ideas because funds have not been available for organizations such as Spindletop Research. We would like to see implication of the title II of the Water Resources Research Act to permit our talents to be used in the protection and development of water resources.

In conclusion, I would like to say that I am personally convinced that more applied research is vitally needed in the field of water and its management and that, from experience, I can assure you that the independent research organizations can and do contribute a high return on the research dollar. Anything that you can do to accelerate this Nation's program will be most welcome.

I appreciate the opportunity to be here today.

Mr. WHITE of Idaho. Thank you very much, Mr. Lambertson. I, too, am interested in the availability of research centers that are oriented to problems in their immediate area, and I think they are a necessary part of the entire research in this water resource problem. I would like to ask one question.

Mr. LAMBERTSON. Yes, sir.

Mr. WHITE of Idaho. You talk about being a water enthusiast. I am also. But something that concerns me a great deal in the waters of my own area, such as we have at Lake Pend Oreille. People come out in that lake with cruisers and every kind of boats you can imagine which discharge sewage directly into the lake. Do you notice a similar activity by those people that we are talking about in your area, do they have any plan for so disposing of wastes other than into the water, on the boats that you have seen in your area?

Mr. LAMBERTSON. I do not believe Kentucky has any unique plans in boats down there. Some of them I do know do use a dash of chlorinated water along with the waste.

Mr. WHITE of Idaho. This is getting to be a real problem in the entire United States where we have boats by the hundreds of thousands coming on to the waters, and these people all want great areas of water provided for their use, and then they pollute them the minute they go on them, also the people along the edge of the water do this. They have a septic tank alongside of the lake and then they run a pipe out 300 feet into the lake and pick up the water they drink. There is something very poor in their own planning that I cannot really understand myself, and I think that it is a problem that is going to have to be looked at, this continuing deterioration of the water quality in some of the most beautiful areas of the United States.

I think there is a responsibility, that is the point I am trying to make, of the users of the recreational facilities, and the waterways of the United States. They have been remiss in this area and it should be brought to their attention very emphatically.

Mr. LAMBERTSON. I agree with you wholeheartedly, Mr. White.

Mr. WHITE of Idaho. I have no further questions.

Mr. Roncalio?

Mr. RONCALIO. Thank you.

Mr. Lambertson, on page 4 of your prepared statement, item 4: "Other ideas taken through the conceptual stage at Spindletop include a way of converting what is now an industrial pollutant to a useful product"; could you let us know what that product is?

Mr. LAMBERTSON. Yes, this is the idea of converting your biologically active material into protein, through the use of bacteria, what is used to make yeast, to use this as an animal feed. We believe this has a tremendous potential.

Mr. RONCALIO. Are you familiar with—

Mr. LAMBERTSON. There are many problems on implementing these kinds of concepts, sir.

Mr. RONCALIO. Are you familiar with the damage done to some of the rivers in the international area of Minnesota by wood chips from wood and pulp plants?

Mr. LAMBERTSON. I know that lignin is a problem. I did not know that wood chips were a major problem. But lignin is a big problem, and it may be approached in this way. This is the most difficult of the cellulose products to which you might apply this technique.

Mr. RONCALIO. The gist of your testimony is that you feel this legislation will make some contribution toward the correction of these abuses—

Mr. LAMBERTSON. Yes, sir.

Mr. RONCALIO (continuing). In the pollution of water.

Mr. LAMBERTSON. If we can convert waste products into useful products, it will help pay for the cost of getting rid of the wastes.

Mr. RONCALIO. Thank you. No further questions.

Mr. WHITE of Idaho. Mr. Skubitz.

Mr. SKUBITZ. No questions.

Mr. WHITE of Idaho. Thank you very much, Mr. Lambertson.

The next witness is Mr. Evan P. Shea, senior chemical engineer, Midwest Research Institute.

Will you come forward, Mr. Shea? I welcome you before the committee. We are glad that you are here to present your testimony and you may proceed.

STATEMENT OF EVAN P. SHEA, SENIOR CHEMICAL ENGINEER, MIDWEST RESEARCH INSTITUTE, KANSAS CITY, MO.

Mr. SHEA. The invitation to appear before this subcommittee expressed an interest in my views as they pertain to the water problems of the Midwest region and the country as a whole.

I am privileged to appear in support of H.R. 3606 to provide money for contract research in water, and my statement will explain why.

I am a chemical engineering graduate of Purdue University class of 1947. Since graduation I have been concerned with water usage

and research. My statement is based on my experience in this field as well as the experiences of others at Midwest Research Institute.

In the past 21 years MRI has conducted programs in the fields of air and water pollution, surveys of water usage for industry, corrosion in saline water, saline water conversion processes, and agricultural water problems.

The water problems of the Midwest region are also common to other parts of the country. My experience has been in the urban areas of the Midwest.

There are 11 common major water problems of the urban areas. These major water problems are:

1. Quality of our water supply.
2. The hydrological cycle of water.
3. Sources of water.
4. Water usage patterns.
5. Water wastage.
6. Water distribution systems.
7. Conservation of water.
8. Water for recreation.
9. Flood control.
10. Water pollution.
11. Total water supply.

Individual cities and industries are trying to cope with a few of these problems, but have only been able to alleviate, not solve them.

Water quality, water cycle, and quantity are presently under study by several agencies of the Government. Sometimes parallel studies are sponsored by more than one agency. The investigators very rarely communicate with other investigators for the same agency, except informally at national meetings. A greater exchange of information between agencies and scientists working in the same general area is needed.

The men doing the work should be acquainted with others' efforts in the field. The results of work presented at symposia and national meetings are generally 2 or more years old. Some method must be found to exchange information currently. The Office of Water Resources Research will need the help of industry, university, and research institute people to formulate and implement a workable system. The amendment under discussion will aid the information transfer process by adding the special talents of the research institutes in technology transfer.

New sources of water for municipal and industrial uses are being investigated by a few agencies of the Government as well as large industrial users of water.

The conservation of water has been a continuing study for many years. The great drought years of the 1930's triggered this effort. Initially it was concerned with agricultural problems. The future needs of cities and industry soon made this work more important. Many agencies, Federal as well as non-Federal, are interested in this aspect of the water problem.

In considering the problem of water conservation one must also involve flood control and recreational water. Some of the techniques developed in the search for better ways to conserve water led to the development of the great flood control and recreational water projects.

Pollution of our water by cities, industry, and agriculture has led to a greater emphasis on this part of the total water problem. Ignoring the problem by the individual segments of our country has led to the establishment by Congress of a centralized agency (Water Pollution Control Agency) to handle the problems of water pollution. Progress has been made in this area, but much remains to be done. The establishment of water pollution laboratories and water research laboratories is a step in the right direction. Involvement of industries and cities must be sought. The combined talents of all will be needed. Technology must be transferred from other disciplines.

The present water distribution systems in our major cities are essentially the same as the original systems. We still treat and render biologically, ecologically, and socially acceptable all water to be used in our cities. In this day of a critical supply of good quality water, and in face of mounting costs of treatment, is it truly necessary to treat every drop of water before use? No major change has been made even though changes have been proposed. Here I am not speaking of materials of construction, but of the systems themselves. Studies of the distribution systems coupled with studies of water usage patterns might well prove that only a portion of our cities' water need be completely treated.

In connection with studies on distribution systems and water usage patterns, the problem of water wastage must also be examined carefully. What is the actual percentage of our treated water that is put into our waste systems without being contaminated? Such things as drinking fountains running continuously, leaking valves, household as well as industrial, and once-through water for air conditioners contribute to the wastage of one of our necessary natural resources.

The Office of Water Resources Research could well undertake to solve the problems of water usage, water wastage, and the water distribution systems. At present no other agency of the Government is studying these problems, as they relate to the cities. Many estimates have been made, by persons knowledgeable in the field, about the amount of water being wasted in our cities. As the water situation becomes more critical, the cities and individual industries must be made more aware of and responsible for their own water problems. Industry looks for a source of good clean water, municipal or otherwise, when looking for new plant sites. Increasingly they are trying to solve their own and the municipal water problem. The A. E. Staley Co. of Decatur, Ill., helped finance a dam on the river to provide water for themselves and the city.

Here I would like to interject also that they provide recreational water and a measure of flood control with this same dam.

To perform this job of technology transfer, the Office is going to need the help of qualified water chemists, engineers, and other scientists in industry and research institutes. This requires the help of all people in the field, not just those in university laboratories. All segments of the scientific and engineering community must help with this task. Without title II of Public Law 88-379 in an easily workable form, certain potentially valuable talent is left out of this effort. I mean the research institutes.

The Office of Water Resources Research should be concerned with the deliberate development of techniques, curriculums, experiments,

and even institutions to provide the Nation with many more effective people serving as "appliers of science."

At the not-for-profit independent research institutes, such as Midwest Research Institute, we find a blending of broad scientific interest with user-oriented values essential to the success of commercial and public missions. Here the man engaged in contract research must visualize clearly the ultimate commercial, economic, or practical objectives of his work.

Informed people have stated that the impact of technology on economic growth in this country is not as great as it would first appear or as would be implicitly expected. The Weinberg report of the President's Science Advisory Committee (officially titled "Science, Government, and Information," dated January 10, 1963) deals with the problem. This report has as one of its key points the need to distinguish between the transfer of documents, the problem receiving the most attention, and the actual transfer of scientific and technical information. One of its key statements is, and I quote:

Transfer of information is an inseparable part of research and development. All those concerned with research and development—individual scientists and engineers, industrial and academic research establishments, technical societies, Government agencies—must accept responsibility for the transfer of information in the same degree and spirit that they accept responsibility for research and development itself.

End of quote.

Technology developed for other fields can be, and in some cases has been, applied to the water problem. To do this, all of the available talent must be utilized. Scientists not directly concerned with water need to be given a consciousness of the problem. Their associates in industry and in research institutes must attract their participation.

With today's shortage of skilled people, the Nation can benefit from an intelligent deployment of labor. In the context of applying science for solving our water problems, the research institutes should have a clearly definable role where they have comparative advantages, that is, being well equipped as knowledge transformers. Often new knowledge requires years or even decades before it is put to economic use. On the other hand, transfer of knowledge can be more effective economically and more capable of acceleration than creation.

Mr. WHITE of Idaho. Thank you very much, Mr. Shea, for your testimony.

I would like to ask you a question about the Midwest Research Institute. How was it formed, how big an operation is it, what contracts do you have?

Mr. SHEA. It was formed by a group of businessmen in Kansas City during the war, who decided that if they were going to keep technical people in the area, and were going to attract industry to an industry-starved area, that this was one way of doing it. It was formed by these men, real estate and bankers, and chartered by the State of Missouri in 1944 when the operation was started.

We have on our staff about 350 people, of whom 225 to 235 are technical people. The rest are administrative supporting people. We have contracts for research, of around \$5.5 million per year split between 70 percent Government-supported, Federal or non-Federal, and 30 percent industrial.

Mr. WHITE of Idaho. But 70 percent of your income comes from the public sector?

Mr. SHEA. Seventy percent will come from the public sector.

Mr. WHITE of Idaho. I should not say income, I should say total research contracts.

Mr. SHEA. Not of our income, of our research business. Our total outgo. The national figures on research now are that the public sector is spending about 75 to 80 percent of the money for research at the present time.

Mr. WHITE of Idaho. Were you here yesterday to hear some of the testimony of some of the people of the Office of Water Resources Research?

Mr. SHEA. No, sir.

Mr. WHITE of Idaho. I might indicate to you in this exchange of information—and you felt that there was a lack in this area—they do have automatic data processing equipment that they are using. They are feeding into it the information as to what has been done in certain areas, whether it has been successful or not. This has been a great help to them in the areas that they are attempting to research, and to look at the programs that are submitted to them. I think this is the same thing that you are talking about: 2-year-old materials being presented at symposiums. I think that they are on top of that a little better than you have indicated.

I have a question. After the first sentence on the top of page 3:

“Amendment under discussion will aid the information transfer process by adding the special talents of the research institutes and technological transfer.”

Would you explain that to me, and why you think this particular amendment would do this?

Mr. SHEA. Well, first let me say that without this amendment Midwest Research Institute in particular will not be involved with the Office of Water Resources Research. As far as the technology transfer, we have underway a fairly large program with NASA, which is directly concerned with transferring technology developed by contractors for NASA to industries. They can use it for process changes, not so much for new products, because most industries do not want to get into new products if they can change a product slightly by adopting some of the techniques that were developed with public money in the NASA program.

We are concerned with this transfer of the technology from the Government sector into the private sector, directly concerned in this program with NASA.

We have also had other programs where we have tried to—medical information or information that has been developed in chemistry programs, medicinal chemistry research, that can be translated for people who have the knowledge and ability to take this on into pharmaceutical preparation application.

Mr. WHITE of Idaho. In other words, you are saying that the fund of information that you have will be made available in the greater water resource research area by your being included in the program through the enactment of this amendment to the statute?

Mr. SHEA. The information that we have developed on how to transfer information from one worker to another worker.

I just finished a program for an agency of the Government, which I will not mention. For 2 years I could have been under the impression that I was the only contractor which that agency had working in this field, because never once was I shown work that anybody else had done, and yet this was work that was in the public interest. There were no patent questions involved, and yet I never had contact with another man, unless I searched him out. I never saw a report, and as far as I know, no report that I turned in was ever shown to anybody, to any other contractor who might have used that information.

I am speaking of progress reports monthly or quarterly. I think this is a waste.

Mr. WHITE of Idaho. It is my understanding that the intent of this Office that has been created will be to keep an information exchange system available to all of the participants in the program, so that they will have the advantage of knowing what is going on in other areas.

I was very much interested in your references to water wastage, and I was surprised last year when we were told that the reservoirs of the city of New York were drawn down below optimum levels or to almost disaster levels, and to find that there was no limitation on use of water in New York City by individuals. There were no meters, and they could turn on the tap and let it run as long as they wanted to, to wash lettuce or their hair or anything else.

In my own area where we have water surpluses, we do control the amount of water that people use, and I think that this is an area that should be looked at very carefully.

I have no further questions.

Mr. Roncalio.

Mr. RONCALIO. I have no questions. Thank you, Mr. Chairman.

Mr. WHITE of Idaho. Mr. Skubitz?

Mr. SKUBITZ. No questions.

Mr. WHITE of Idaho. The staff has a question.

Mr. McFARLAND. Mr. Shea, on the matter of water wastage, and particularly with respect to the sentence on the bottom of page 4, "The Office of Water Resources Research could well undertake to solve the problems of water usage, water wastage and the water distribution systems," and I believe you are referring to cities.

Mr. SHEA. Only, yes.

Mr. McFARLAND. The first question, do you think that the Federal Government should be responsible, primarily responsible, for these matters or do you think the cities themselves should be?

Mr. SHEA. I think the cities themselves are primarily responsible, but I am not sure that unless the problem is brought home to them by somebody, that they are financially able.

Mr. McFARLAND. I am having difficulty relating this particular proposal of yours to the mission of the Department of the Interior. Do you feel this is closely enough related to the mission of the Department of the Interior that they could sponsor this type of research?

Mr. SHEA. As I remember the bill, Interior has to study problems in water not presently being studied by other agencies of the Government, of our total water resource.

Mr. McFARLAND. You are referring to the language of the act, of the proposed amendment, which says the research would have to be

related to missions of the Department of the Interior, and involve problems that are not otherwise being studied?

Mr. SHEA. Right.

Mr. McFARLAND. But it has to relate to the missions of the Department of the Interior?

Mr. SHEA. The missions of the Department of the Interior.

Mr. McFARLAND. That is the requirement?

Mr. SHEA. Yes, and unless I am completely mistaken, I thought that the conservation and usage of our water was also one of their problems.

Mr. McFARLAND. If the water wastage by cities is a problem of the Interior Department, I would like to know for my own information what division or branch or bureau or agency has that responsibility.

Mr. SHEA. Presently in none.

Mr. McFARLAND. Then if it is in none now, this does not change the situation.

That is all, Mr. Chairman.

Mr. WHITE of Idaho. Thank you very much for your testimony.

Mr. SHEA. Thank you.

Mr. WHITE of Idaho. The next witness is Dr. Joseph R. Feldmeier, director, Franklin Institute Research Laboratories.

We are glad to have you before the committee, Doctor. We welcome your testimony and you may proceed in your own way.

STATEMENT OF JOSEPH R. FELDMEIER, DIRECTOR, FRANKLIN INSTITUTE RESEARCH LABORATORIES

Mr. FELDMEIER. Thank you, sir.

Mr. Chairman, the utilization, management conservation, and development of water resources constitutes an immense problem in our present-day world of rapidly expanding population. The creation of the Office of Water Resources Research, and the thinking, planning, study, and debate underlying this creation bear evidence that a genuine need for intensive research exists, even though this need may be currently ill defined in terms of the exact problems which face us.

The problems of water resources are not confined to our country alone, but are international in scope. Therefore, the United States must not only find solutions to its own problems for the welfare of its citizens, but, in order to maintain its image as a world leader interested in the well-being of all mankind, should assist other countries as well.

In view of these premises, we endorse the establishment of the Office of Water Resources Research, and the passage of title I of the enabling act.

As with most large-scale problems, this one requires an approach utilizing many disciplines, including all segments of scientific technology as well as the areas of economics, world politics, and the social sciences.

Since there exist numerous competing consumers for the water resources at our disposal, and since such a variety of disciplines is involved in accurately defining and solving the water resources problem, a systems approach on a broad front appears to be essential.

In our opinion, the urgency of the problem, the global scope of the problem, and the indicated approach to its treatment all point to the

requirement that this country devote all of its research resources to the search for solutions.

Title I of the Water Resources Research Act provides for drawing on only those research facilities and capabilities available in the colleges and universities of our land. Title II of the act provides both funds and authority for the award of research contracts to institutions and firms other than those which are purely academic or educational in nature.

On the other hand, the limitation on title II funds, and the restrictions on the administration of these funds under title II as it presently exists, so severely limits the authority of the Office of Water Resources Research as to become merely a token acceptance of the realization that organizations other than colleges and universities are needed to bridge the gap between the current and the desired state of affairs.

These "other organizations" who are in a position to render invaluable research assistance embrace at least the not-for-profit research institutes plus large portions of our Nation's industrial complex. Since the Franklin Institute Research Laboratories are a not-for-profit research organization, we will limit our remarks to only that segment of the research sources available.

We feel it appropriate at this juncture to present our view of the role in which we cast ourselves, and which we believe is typical of the other not-for-profit research institutes. This role is that of maintaining a center of scientific excellence with the prime purpose of serving the total community. Our role in this respect relates to the application of scientific principles and techniques to present and future problems, and to accomplish these ends in a manner not concerned with manufacturing, profit, or teaching.

In our attempt to fill this role, we have nourished and developed talents, capabilities, and an orientation not generally available in either academic institutions nor in industry. We believe that these assets can be of great value in helping to meet, define, and solve the ever-increasing problems in the field of water resources.

We say this with absolutely no prejudice toward either the academic or the industrial spheres, since we believe their capabilities are also needed in the research effort contemplated.

President Johnson's desire to assist the colleges and universities in the furtherance of their role as educators, and his intent to create centers of technology in the colleges and universities, are both understandable and commendable.

We believe, however, that this is a separate problem, and we do not believe that matters of such grave national and international consequences as the water resources problem should become the vehicle for this accomplishment.

In summary then, we believe that:

1. In view of our expanding population and the increasing number of competitive consumers, the water resources problem is urgent and requires immediate and continuing attention.

2. The problem is not only national, but is global in its scope, its urgency, and its consequences.

3. Our country has acted wisely in establishing an Office of Water Resources Research to meet these problems and in empowering that Office to seek and utilize outside research talent.

4. The needs and the urgency are such as to demand the fullest utilization of the most highly skilled research capabilities, wherever they may be.

5. The enabling legislation has somewhat hampered total utilization of all of the research capacity available by severely limiting the funds and authority of the Office of Water Resources Research in dealing with those segments of the research community which lie outside colleges and universities.

6. The national desire to aid our academic institutions, and the national desire to master our water resources, are separate problems, and should not become confused with one another.

Therefore, we further believe that title II of the Water Resources Research Act should receive further consideration with a view to enlarging the funds and expanding the authority of the Office of Water Resources Research in bringing to bear the full power of our Nation's research capabilities to master the challenging water resources problem.

Mr. WHITE of Idaho. Thank you very much, Mr. Feldmeier.

With respect to your last paragraph, are you suggesting an expansion greater than that now included in the proposed legislation?

Mr. FELDMIEER. No; I am not, sir.

As the legislation is written, it already specifies sizable funds, which, if combined with those that are specified in title I, would be a desirable addition. I think we should proceed into this area with some of the caution that you have indicated, because the Federal Government cannot pay for everything that we would like. It has to be selective. And a careful approach into these new areas, to make sure that they are productive, is in order, and so the beginning here is proper.

But the administrative encumbrance seems to be a difficulty which prevents organizations like mine from participating in the program.

Mr. WHITE of Idaho. I appreciate your remarks in that area.

I would like to say to you that I have long been familiar with the Franklin Institute and I have held them in high esteem for some time.

Any questions, Mr. Skubitz?

Mr. SKUBITZ. Dr. Feldmeier, on page 2, the second paragraph, you state:

On the other hand, the limitation in title II funds, the restrictions on the administration of these funds under title II as it presently exists so severely limits the authority of the Office of Water Resources Research as to become merely a token acceptance.

What do you mean "so severely limits"?

Mr. FELDMIEER. I am addressing myself, sir, to the subject of the way the law is practiced.

The Office of Water Resources Research was able, under title I, to immediately move in and implement the intentions of title I, with the controls that are outlined there in the first 2½ pages of the bill. They apparently have found themselves incapable of dealing with the allocation of the funds until title II, with the limitations properly placed by you gentlemen in the one-quarter of a page that is contained within the bill.

Actually, my thoughts back of this, where it says "as it presently exists," I fully recognize the authority you have and must place in monitoring these things. I reference the authority that the Joint Com-

mittee of the Atomic Energy Commission has in satisfying its responsibility, and I say that many of the techniques used by the Atomic Energy Commission, and I think the restrictions placed on title I in the 2½ pages here are really quite appropriate.

I think as written maybe we need some expansion of title II in order to satisfy your responsibility and make the operation of the bill more practical.

Mr. SKUBITZ. Dr. Feldmeier, as director of the Franklin Institute, do you ever monitor any projects that you authorize?

Mr. FELDMEIER. It is a question of degree, sir, that I am addressing myself to. We all have that responsibility, and believe me, while I am away today, there are many things going on that I cannot monitor today. But I have to inject into my system certain control checks, whereby when I am absent, things can proceed, and yet I can tie into it and make sure that we are, in general, going down the right path.

So I am addressing myself to the degree of monitoring.

The Atomic Energy Commission, as I indicated, has this problem too, and they have solved it in a certain way. Title I has this problem, and it is solved in 2½ pages.

I think title II has this problem also, and I sympathize with you that you do have to inject yourself into the controls. It is a question of the degree on item for item, and just how you maintain your relationship to the Office of Water Resources Research, and I am not telling you how to do that.

I think that we need some help there. But what we have just is not working, and that is what I am concerned about. I am interested in a working arrangement.

Mr. WHITE of Idaho. Thank you, Mr. Feldmeier.

The next witness is Mr. R. A. Burns, director of the contract development.

STATEMENT OF R. A. BURNS, DIRECTOR, CONTRACT DEVELOPMENT, CYRUS W. RICE & SONS

Mr. BURNS. Thank you, Mr. Chairman.

Mr. WHITE of Idaho. Am I properly introducing you, Mr. Burns; R. A. Burns, director of contract development, Cyrus W. Rice & Sons? Is that correct?

Mr. BURNS. Yes, sir; Mr. James K. Rice, president of Cyrus W. Rice & Co., has prepared a statement for presentation to you, but Mr. Rice was unable to be here and I request in his absence permission to read his statement.

Mr. WHITE of Idaho. We will be very glad to have his statement.

Mr. BURNS. Thank you.

I appreciate the privilege of being able to present this statement before the Subcommittee on Irrigation and Reclamation of the House Committee on Interior and Insular Affairs in behalf of S. 22, a bill to amend Public Law 88-379.

I wish to emphasize at the outset that I believe only full implementation of title II as in the proposed amendment embodied in S. 22 will bring the broad range of talent and facilities available to bear upon the problems of efficient use of our water resources.

My interest in water resources research stems from almost 20 years of experience with the problems of industrial water management: treatment of water for its special uses, reuses, and disposal.

As the committee is well aware, the various divisions of the Federal, State, and local governments are actively engaged in conducting or sponsoring research in certain sectors of the general area of water resources. One of the sectors that remains to be covered adequately is that concerned with water for within and from industry. Those water-use problems that are peculiar to a specific industry, paper or food processing, for example, are and generally should remain in the province of privately sponsored research.

There are certain water uses, however, that are common to many industries and are properly the subject of publicly sponsored research if they are to be solved in any reasonable period of time and in a coordinated fashion.

The evaporative processes are a good example of a common industrial water use. Among these is steam generation. The water quality requirements for efficient energy utilization in steam systems are set largely by the necessity to prevent the formation of deposits within them. Today we devote our efforts to producing or finding a high-quality water for such systems.

Can we find a means to prevent or to handle these deposits so effectively that the quality requirements can be lowered and water supplies of very low quality utilized economically?

If so, we could use a great deal of waste water directly, instead of discharging it to streams.

Another common industrial water use is for cooling. Industry generally rejects unwanted heat to water. Some of the heat rejection is to water passing through the equipment once and to waste; some to water that is recirculated through a spray tower where air cools it by evaporation after which the water returns to cool the process. In either case, the heat rejected results ultimately in the evaporation of water to atmosphere.

Can the rate of this evaporative process when it occurs in a river be enhanced by practical means?

What is necessary to successfully substitute waste water of various kinds for the fresh water normally used to supply recirculated cooling tower systems?

How can brackish waters be used economically for cooling system makeup?

In both examples given, successful research would allow poor quality water that is not suitable as a potable source to be substituted for water that is potable and thus either preserve or create additional water resources.

The private research in industrial water treatment in the past has been generally in the direction of improving the quality of the water, for example, that is furnished to boilers and to cooling towers. In practice, the treatment to improve the quality supplied to these processes removes matter from the water and in so doing generates several additional parts of waste matter for every part removed from the supply. If, instead, the processes themselves could be made more tolerant and could use very much lower quality supplies without extensive

treatment or desalination, less wastes would be generated and previously unusable sources, such as saline water, be tapped.

The use of water resources for steam generation or for cooling is so common to so many industries and the solutions to problems of lower quality use so likely to involve both new equipment and new chemicals or new processes, that significant progress in this area is unlikely unless the seed research is Federally-sponsored.

Research on problems such as I have discussed requires at the start a close contact with industry and extensive experience and which are capable of relevant research in this sector are either profitmaking research firms or nonprofit private research institutions.

Title II of Public Law 88-379 as it now stands has the practical effect of excluding these private profit and nonprofit research organizations from research on water resources problems.

The Congress recognized that there is an immediate need for research on water resources, that the existing organizations were not covering all of the sectors of needed research, and that there exists a shortage of trained and experienced people to conduct the research. I believe it to be consistent with these expressed aims to urge that the talents and experience of the private profit and nonprofit research organizations be utilized fully in this search for solutions to water resources problems.

Amendment of Public Law 88-379 as proposed by S. 22 would help to accomplish the goals intended by the law.

Mr. WHITE of Idaho. Thank you very much, Mr. Burns.

I have no questions, but I might suggest that you make sure that Mr. Eaton gets a copy of it, because I believe it has some very interesting areas to be explored, particularly in the waste products area.

Mr. BURNS. Thank you very much.

Mr. WHITE of Idaho. Mr. Skubitz?

Mr. SKUBITZ. No questions.

Mr. BURNS. Thank you very much.

Mr. WHITE of Idaho. The last witness is Mr. Frank A. Butrico, director, environmental health science programs, Battelle Memorial Institute.

I welcome you before the committee, Mr. Butrico.

You may proceed.

STATEMENT OF FRANK A. BUTRICO, DIRECTOR, ENVIRONMENTAL HEALTH SCIENCES PROGRAM, BATTELLE MEMORIAL INSTITUTE

Mr. BUTRICO. Mr. Chairman and other distinguished gentlemen, it is an honor to appear before you as an individual and as a representative of Battelle Memorial Institute. I hope my remarks will be as well defined as I feel are the issues facing this subcommittee today.

By way of background, I am a registered professional engineer, and a diplomat of the American Academy of Sanitary Engineers, with 22 years of experience in the field of public health.

While in the Public Health Service, I was concerned with many problems of the environment, including water resources and pollution control. It was my privilege to be executive secretary of the National Conference on Water Pollution, which was called by Presi-

dent Eisenhower in 1960. I am now director of environmental health sciences programs at the Battelle Memorial Institute, a not-for-profit organization which has major research laboratory divisions in Richland, Wash., and Columbus, Ohio, and which, as an institution, is represented on the Water Resources Research Council.

The Water Resources Research Act passed by the 88th Congress represents a significant step toward solving the Nation's No. 1 natural resources problem, and the Congress should be commended for this action. However, much more must be done if effective water resources management is to be accomplished.

As in almost all problem solving, research is essential, and an effective research program requires financial support and the availability of physical and personnel resources.

Passage of the Water Resources Research Act (Public Law 88-379, July 17, 1964) will permit utilization of the resources at the Institutes established under the act. No doubt excellent research will be conducted at these laboratories, and they will fulfill a necessary function in the training of scientists and engineers to work in this field.

However, these resources should be supplemented with those of the non-land-grant institutions, private and industrial laboratories, so that there will be maximum utilization of available scientific manpower. This is essential for reasons other than just adding to the manpower pool committed to research in the water resources field.

The private research institutions, for instance, are problem oriented, have the administrative framework which permits an interdisciplinary approach to problem solving and research, and many, such as the Battelle Memorial Institute which I represent, have unique capabilities and facilities which can be made available to do research in this most important field.

Permit me to illustrate this with specific examples of the kinds of research which can be undertaken if the provisions of the legislation before the subcommittee are enacted and funds are made available.

There is need for a regional and river basin approach to water resource management. This need was expressed by President Johnson in his state of the Union message on January 12, 1966, by the President's Federal Council for Science and Technology, and by others.

In determining present water needs, and to project future water resources, uses, and needs, a whole host of interacting variables must be considered. The interrelationship among these factors is such that changing one may often change many others. Therefore, what is needed is an integrated way of looking at water and water-related variables. Since the number of variables is so large, only a model can provide the framework needed.

Mathematical models have the advantage in that they can be simulated on a computer, making many analyses possible under a wide variety of assumptions. In essence, a "management laboratory" can be created, which allows experimentation with policy alternatives.

The Battelle-Columbus Laboratory has undertaken such comprehensive studies which have focused on economic activities in an area and the relation to future water requirements.

Inasmuch as water is a mineral resource, and waste water is returned through the ground water cycle, research in the area of geo-

logical science is pertinent. The same geological principles apply to water as to other mineral deposits. So that the problems of ground water largely resolve themselves into two categories—the physical properties of the rocks, such as porosity and permeability, and their mineralogical and geochemical properties.

Hand in hand with almost any aspect of water quality control is the need for monitoring of water. A monitoring scheme has been conceived featuring the use of a living organism for detection and mass spectrometry for chemical analysis of dangerous contaminants.

The monitoring system visualized consists of a biosensing device judiciously placed in streams of basins so that contact with a harmful pollutant will activate an automatic chemical analysis system. Heretofore, water-stream monitoring systems have relied on physical and chemical phenomena for sensing devices. However, the assessment of physiochemical data in terms of biological significance can be misleading. Hence, it is believed that a monitoring system based on a biosensing device could provide a more reliable measure of toxicity to humans.

Automatic data processing and other computer capabilities, along with information centers, are essential to enhancing the opportunities for greater research gains and to improve communications among scientists. Many Federal agencies are attempting to improve the exchange of information, but other experiences in scientific documentation and communications which are available should be utilized.

There are facilities and personnel actively engaged in studies of the distribution, pathology, and physiology of marine and fresh water invertebrates. The fish population of the Yakima and Columbia Rivers have been the subject of intensive research, in both the field and the laboratory, for many years. Many of these past studies have dealt with the metabolism of radionuclei.

It is perfectly reasonable, however, that these sophisticated and unique approaches could be concentrated upon the metabolism of pesticides and herbicides that are found in water.

Seepage losses from unlined and earth-lined canals have been a subject of considerable interest to the arid West. Hydrological research conducted at the Pacific Northwest Laboratory has included studies of saturated and partially saturated flow in porous media. These studies are directed primarily toward obtaining a better understanding of radioactive liquid waste movement rates and distribution patterns in the vadose and saturated zones.

Although this research is related principally to the atomic energy field, the analytical techniques and solution methods that have been developed have application in solving other practical hydrologic problems.

Ground water reservoirs are important in the hydrologic cycle. Research is being directed toward the development and application of more accurate methods for analyzing the three-dimensional flow of ground water and contained pollutants through heterogeneous soil systems. A digital computer program is available for analyzing steady flow through heterogeneous saturated or unsaturated soil.

It is hoped that these examples will be helpful to the subcommittee in its deliberations on H.R. 3606.

Also, it is my intention to convey to the subcommittee that there is a wealth of experience in the scientific community—universities, private laboratories, and industry—and that there are available scientists, who have not traditionally worked in the field of water resources, who could apply techniques used successfully in other fields of endeavor to solve water problems. In many cases, the capabilities of these scientists has been enhanced at Government expense, and in my opinion is a resource which should be put to effective use. Interest in the field is high, and the research needs have been defined sufficiently to permit a “targeted” effort to get answers to pressing problems.

We will be glad to respond to this need and to develop scientifically sound research proposals if requested.

May I supplement my remarks?

Mr. WHITE of Idaho. You may.

Mr. BUTRICO. In concluding my formal statement, I mentioned “targeted research.” This is a key factor as it relates to title II of the legislation before this subcommittee. Many competent individuals and groups have identified areas of research need in water resources management. Much of the Federal Government’s support should be focused on projects related to these needs. No doubt excellent research work will be done at the land-grant colleges, but if experience with grant programs prevails it can be expected that a good percentage of the university effort will be on projects of interest to the investigators, and may or may not be related to needs. Incidentally, these projects will no doubt be scientifically sound and add to our scientific base. However, there are pressing problems which require immediate attention, and title II should be focused on these needs.

Mr. WHITE of Idaho. I thank you for your statement very much, Mr. Butrico. I think your statement is very thought-provoking, and indicates a personal knowledge in your own right in the various areas of water research.

I agree with you that the basic research can probably be best done at some of the universities and reservoirs of basic research scientists, and that the applied research must be done with those people that are interested in looking for solutions in specific areas.

I would like to bring to the attention of the witnesses who are still here that the Assistant Director of the Office of Water Resources Research has been here for all of your testimony, and I think that it shows an interest in the testimony that has been given here.

Mr. Eaton will perhaps be dealing with you in the future, so I do want to bring that to the attention of the people in the room, and to the members of the committee.

Mr. Skubitz?

Mr. SKUBITZ. No questions.

Mr. WHITE of Idaho. You may be excused.

Mr. BUTRICO. Thank you.

Mr. WHITE of Idaho. Without objection, the statement of Dr. Arthur Maass, chairman of the department of the Harvard water program, will be included in the record at this point.

Without objection, the statement of the Izaak Walton League of American with respect to S. 22, 3806 and related bills will be included in the record.

Without objection, the statement of the League of Women Voters in support of H.R. 3606 and companion bills, by Mrs. Haskell Rosenblum, director of the League of Women Voters of the United States, will be included in the record.

Without objection, the statement by Frank Gregg, vice president of the Conservation Foundation, in support of S. 22 will be included in the record.

Without objection, the statement by Bernard J. Wachter, editor, Industrial Water Engineering magazine, will be included in the record, and without objection the following letters will be included in the record:

A letter from the National Reclamation Association to Congressman Walter Rogers, chairman of the Subcommittee on Irrigation and Reclamation, signed by Mr. Bronn, February 14, 1966.

A letter directed to Mr. Walter Rogers, chairman of the Subcommittee on Irrigation and Reclamation from the Sports Fishing Institute, dated February 14, signed by Mr. Philip A. Douglas, executive secretary.

A letter directed to Hon. Walter D. Rogers, chairman of the Subcommittee on Irrigation and Reclamation from the Wildlife Management Institute, signed by C. R. Gutermuth, vice president.

A letter directed to Chairman Wayne Aspinall, dated February 10, from the National Wildlife Federation, signed by Thomas L. Kimball, executive director.

A letter directed to the Honorable Wayne Aspinall, chairman, Committee on Interior and Insular Affairs, from the Temporary State Commission on Water Resources Planning, Assembly Chamber, Capitol, Albany, N.Y., February 10, 1966, signed by Albert J. Hausbeck, chairman.

(The documents referred to follow :)

STATEMENT OF DR. ARTHUR MAASS ON WATER RESEARCH

I am professor of government at Harvard University and have been doing water resources research for over 25 years. I was faculty chairman of the Harvard water program, a research program involving engineers, economists, and political scientists, from 1955 to 1965 and I am a member of the advisory panel to review and evaluate the work of the Office of Water Resources Research.

As previous witnesses have testified, the OWRR advisory panel has recommended urgently that title II be amended as proposed in S. 22 and other bills before you.

As enacted by Congress, the Water Resources Research Act of 1964 provides for a fairly well balanced research program. Major emphasis and the lion's share of the money are given to research at the 51 land-grant universities, at which water research institutes are to be established (title I). This was supplemented by an authorization for research at non-land-grant institutions—private centers of excellence as they were called at the Senate hearings (title II). Although the dollar limit authorized by title II is probably too stringent, and the requirement that universities with institutes must match all research project grants probably too rigid, it is nonetheless the combination of the two titles that gave balance, and the promise of high-quality results, to the new program.

The President, in signing the bill, found title II unacceptable in its present form, and as a consequence we now have an unbalanced and an inadequate program. S. 22, by amending title II, eliminating the so-called committee veto provision to which the President objects and making other desirable changes, would restore balance and greater promise to the Federal Government's support of water resources research.

The report of the advisory panel recommends "that OWRR and associated water scientists across the country must, very quickly, begin to focus more attention on identification of critical gaps in water knowledge and move to foster research that will fill the gaps." The panel found that the research projects initiated by the 51 institutes concentrated heavily on problems of hydrology and the water cycle, and they identified several of the critical gaps—namely, "economic, political, social, legal, and organizational problems associated with the Nation's water future" and especially with "the sharply urbanizing trends of the Nation," and questions related to the "increase in the tempo of river basin planning throughout the country." From my experience, it is just in these areas—especially in techniques for relating engineering analysis, economic objectives, and governmental planning—that several of the universities that do not have institutes under title I can do the most challenging work. I can give as examples Stanford, Chicago, and Johns Hopkins Universities. The advisory panel concluded that: "Indeed, we block out large areas of unique competence from the Nation's water research service when we arbitrarily limit ourselves to the land-grant institutions." What's more, we seem to limit ourselves especially in those areas where there are critical research gaps.

The training of water resources experts is a purpose of the 1964 act, and here too it would be self-defeating if we were to discourage educational institutions other than the designated 51 from emphasizing this activity. Certainly there are good students at these other institutions, and to the extent that we fail to encourage any interest that they may have in water resources research, the whole program will be the loser. From my own experience at Harvard, it is largely because we had a water resources research program that we were able to attract into the field several young men who might otherwise have dedicated their considerable talents to other fields. Two examples are Stephen Marglin who, as a very young man, is today one of the leading economists in this field in the United States, and Myron Fiering, also young, who is a recognized leader and innovator in systems analysis and the simulation of river systems on high speed computers.

In this connection, I quote again from the OWRR panel report: "* * * it is the unanimous judgment of the panel that the water research effort and the training of water scientists are being gravely restricted by the failure of the Water Resources Research Act, to enlist, on a par with the land-grant colleges and universities, the contributions and talents of other well-qualified institutions individuals, and agencies."

Finally, university and other research organizations that do not have institutes and title I can serve an important role in the evaluation of water resources research and in setting benchmarks for such evaluations. The advisory panel recognized the importance of high standards for evaluation, and it recommended that OWRR sponsor a series of perspective and evaluative studies by individuals of outstanding competence—studies that would direct attention to broad areas of subject matter where research is needed and would help fix benchmarks for evaluating results.

If OWRR is to use the best available scientists and scholars for this critically important activity, then it must have freedom to make research contracts with these men wherever they may work. The enactment of S. 22 will make this possible. Also it should reduce significantly the necessity for OWRR's attempting to recruit such experts for full-time Federal employment. I do not think that it is an exaggeration to say that the United States will likely achieve greater economy in its water resources research program with title II than without it—that the benefits, in terms of knowledge relevant to our water problems, will be greater per dollar of expenditure with the enactment of S. 22 than without it.

STATEMENT OF THE IZAAK WALTON LEAGUE OF AMERICA, PRESENTED BY
J. W. PENFOLD

Mr. Chairman, I am J. W. Penfold, conservation director of the Izaak Walton League of America. The league is a national organization of citizens dedicated to the conservation and wise use of the Nation's natural resources wealth. We appreciate the privilege of appearing in support of the legislation before you.

The Izaak Walton League, as well as most other citizen conservation societies, supported the legislation in the last Congress which became Public Law 88-379. The purpose of that act—to assure the Nation "* * * at all times of a supply

of water sufficient in quantity and quality to meet the requirements of its expanding population * * *—is certainly one which we all recognize as a national imperative. The programs provided by the act through which its objectives would be attained seems to us basic and appropriate:

1. To assist in the development of water resources research centers in each State and in Puerto Rico;
2. A matching grant program to stimulate and carry out specific water resources research; and
3. A program through which by direct grants, contracts, matching, or other arrangements with educational institutions, public or private agencies, organizations or individuals, OWRR may sponsor or direct research in specific scientific areas.

The first two of these programs are well underway. The immediate and excellent response of the 51 State universities involved and the progress made in just 1 year should satisfy the Congress that in Public Law 88-379 it legislated well. It is apparent also that the Office of Water Resources Research is in very able hands.

The third portion of the program, however, has not been implemented, and, as we understand it, the purpose of the legislation before you is, by amendment, to eliminate the hiatus that has stymied progress in this important sector. We believe this action to be essential.

I won't try to repeat the arguments for this action so ably presented by earlier and very expert witnesses. But I would like to cite one example of particular meaning to the outdoor public, which points up the need and illustrates how OWRR could use its further authorities to increase the value of its work for the public, and for all of the States.

The Water Quality Act of 1965—which strengthened the Federal water pollution control program—provides for the establishment of water quality standards on interstate waters. While the ultimate authority to do this is placed in the Secretary of HEW, Congress wisely afforded each of the States the opportunity to develop such standards and the programs for their implementation and enforcement. If these fully measure up in adequacy to meet the national interest the Secretary may adopt the States' proposals for standards as the Federal standards. If they do not measure up, or if a State does not act, the Secretary is directed to take steps which will result in satisfactory standards for those waters.

Right now, all of the States are wrestling with this problem and opportunity, and it is a complex one. A great deal of the scientific knowledge which ought to be available for their use now, simply is unknown. Research in the past in this phase of water resources as in others, has not been adequate. Without such knowledge, we shall be fumbling as we approach the job of establishing water quality standards, when we need to be very precise. Let me be more specific.

Water quality criteria for a thriving trout population in a stream, among other things, may require temperatures that never rise above 70° F. and a dissolved oxygen content always above four parts per million. Such criteria are not negotiable. If the public desires a thriving trout population in that stream, the stream must have such continuing characteristics. To maintain such a standard, however, or to accept a lower one which will not permit trout, is a political decision which the people themselves must make.

The stream may be subject to other contaminants which the trout themselves can survive all right, but which may curtail or limit the food chain upon which they are dependent or as in the case of silt, may obliterate spawning beds and so eventually eliminate the trout. Again, the standard which the public decides to apply to that stream, must fully take into account these other contaminants—either permit them, in which case no trout—or insist on their removal so as to have trout.

This kinds of example could be extended almost endlessly, to include the basses, perches, pikes, and catfish; the tarpon, snook, bonefish, shrimp, and shell fish. We have to know what characteristics of aquatic environment these fishes require to thrive. We have to know what characteristics of environment the aquatic flora and fauna must have, if they are to thrive and to support the higher species. We have to know the levels of concentration of a host of existing or potential contaminants above which we dare not go—if the political decision of the people is for a sufficiently high standard to maintain a sport fishery in a particular body of water.

The ramifications of this are many and they are important to the welfare of the community and its economy. The availability of such areas of knowledge will have basic effect on industrial processes, the design of waste treatment and disposal systems, recycling, monitoring systems and enforcement organization, and procedures. They will have a direct bearing on community decisions as to financing, bond issues, and taxes. They will have direct influence on community and regional planning.

I do not mean to suggest that no research has been going on in this field, nor that we are devoid of any knowledge in it. On the contrary, our knowledge is growing—and at the Federal level, a research branch in the Water Pollution Control Administration has direct responsibilities in this field. Congress in recent appropriation actions has accelerated the program and we applaud this. Nonetheless, present knowledge is sketchy and inadequate to meet the practical problems facing the States and the public right now. We must eliminate these knowledge gaps as fast as we can.

Enactment of this legislation will provide authorization to OWRR to move aggressively on it in cooperation with HEW, State game and fish agencies, and others to pinpoint some key gaps, find the institutions or agencies equipped and able to undertake the research, award the contracts and in the shortest possible time secure the needed data. The States and the Secretary can then use these with confidence in developing water quality standards and related programs to achieve them, the public can make the necessary political decisions with far more assurance than they can today and, the Water Quality Act of 1965 will more quickly achieve its high public purposes.

I've tried to suggest just one example in just one area of water resources concern. I am confident that throughout the world of water resources there will be hundreds of others, where we cannot expect present programs, however excellent they may be, and they are, to move as quickly and as precisely as practical knowledge needs may require.

It seems to us that with the authorities which the act would extend, OWRR will have the flexibility and the ability to supplement and complement most precisely and effectively the total water resources research effort, wherever carried on, to tap research skills not reached through other programs and, most importantly, to move fast to plug knowledge gaps which are of immediate, practical importance to the public.

We believe the full purpose of Public Law 88-379 will not be achieved without this further authority. We respectfully urge your favorable action on the legislation.

We appreciate the privilege of appearing before this committee.

STATEMENT BY MRS. HASKELL ROSENBLUM, A DIRECTOR OF THE LEAGUE OF WOMEN
VOTERS OF THE UNITED STATES

When the House Interior Committee reported out the bill which became the Water Resources Research Act, it recognized the need for research to help cope "with the mounting water-use problems posed by the projected growth of our population and economy" and also for the "training of greater numbers of needed scientists." The League of Women Voters of the United States, which presented testimony in support of legislation for research centers, would like to commend this committee for the leadership which the committee has given to efforts to solve the Nation's growing water resource problems.

The League of Women Voters supports the amendments to the Research Act as proposed in H.R. 3606, H.R. 5930, H.R. 6282, H.R. 8916, and S. 22 to authorize financial help for water research by institutions, agencies, and individuals to whom the Federal Government, under the Water Resources Research Act, does not now provide such aid. In our judgment, among those that now cannot receive financial support for water research programs are private institutions, other colleges and universities, and Government agencies already staffed with men and women competent in research. To ignore the contribution these people could make to the water research effort seems to us unwise.

We have been pleased to see that since the passage of the Research Act 51 centers have been established at which work is proceeding along the lines the Interior Committee envisaged. The very establishment of these centers has given impetus to other educational institutions to develop regular courses in water resources where there were none previously. These newly established

programs and the other private and educational institutions and Government agencies may well be in a position to attack problems which the research centers have neither staff nor interest to undertake. For example, few land-grant colleges are located in large urban centers. Understandably they might not recognize the urgency of the urbanization problem and its effect on water resources. We think the centers may have widest appeal for hydrologists, engineers, and agricultural experts rather than for the political scientists who will increasingly be needed to help citizens understand the problems and make the necessary decisions. Our members have a vital concern that there should be research into the process by which public decisions are made in the water field, whether these are decisions on bond issues, on basin planning and development, or on intergovernmental arrangements.

Should this committee decide that additional grants were to be extended only over a period of 10 years, as in section 100 of Public Law 88-379, to allow the committee to review the contributions of the program, the League of Women Voters would agree. We urge your favorable action on the concept of the bills before you.

STATEMENT OF FRANK GREGG, VICE PRESIDENT, THE CONSERVATION FOUNDATION

Mr. Chairman, I am Frank Gregg, vice president of the Conservation Foundation, 1250 Connecticut Avenue, Washington, D.C. The foundation is a nonprofit scientific and educational organization chartered under the laws of the State of New York. Our purposes are to promote greater knowledge about the earth's resources—its waters, soils, minerals, plant and animal life; to initiate research and education concerning these resources and their relation to each other; to ascertain the most effective methods of making them available and useful to people; to assess population trends and their effect upon environment.

Within the limits of its resources, the foundation has attempted to stimulate research in the management of water and related land resources. The foundation has from its founding in 1947 encouraged an interdisciplinary approach to natural resource studies. It has attempted to find and respond to opportunities for significant research by qualified investigators from a wide variety of disciplines and institutional associations.

In a modest way, the foundation's support for research projects has anticipated and paralleled the flexible approach proposed by S. 22. Attached as a part of this statement is a list of selected studies in or related to water resources supported by or carried out by the foundation.

It is against this background of experience that we express our belief that the programs authorized by S. 22 can be of significant help in finding better ways of conserving and utilizing the Nation's limited water resources.

This committee can take deep satisfaction in the progress that has been made under title I of Public Law 88-379. We understand that there are now 51 water resources research institutes receiving assistance under the act; that over 450 individual research projects have been funded and are underway; and that applications for assistance by other qualified investigators have been necessarily denied for lack of funds.

We have reviewed the list of funded projects set forth in the "1965 Annual Report of the Office of Water Resources Research," and we are pleased to see the diverse range of research areas and strategies receiving assistance.

The variety of fields covered—properties of water, the water cycle, quality, law, utilization, economics, ecology, recreation, fish and wildlife—and the diversity of researchers within these fields suggest that the administrators of the research centers and of the Office of Water Resources Research have been responsive to the desire of the Congress for an interdisciplinary and multidisciplinary water resources research program.

The purpose of S. 22, as we understand it, is to stimulate, through financial assistance, the development and effective utilization of research capacity of institutions and individuals not connected with the centers now established at land-grant colleges and universities. While maintaining high regard for the effectiveness of research carried out by and through the centers, we believe that the urgency of national water needs requires this broadening of research activity and competence.

An interesting illustration of the kinds of competence which may be directed to natural resource problems was provided recently in California, where a number of aerospace industries undertook analyses of waste disposal problems at the request of the State government.

You have seen descriptions of the results of these studies. Without judging the value of the studies, we suggest that the application of techniques of systems analysis used in space science and technology may prove immensely helpful in designing and executing orderly research into water resources problems. By way of further illustration, we would like to describe two kinds of problems which we believe will require attention of both the existing centers and of other investigators assisted under the revised title II.

There is urgent need for research by a number of disciplines into the problems of water and related land uses in urban and urbanizing areas.

There is intense concern about and controversy over urban land use. By and large, attention is centered on competition among alternative land uses—public open space versus subdivision, for instance. But there has been, so far as we know, relatively little effective concern about the impacts of alternative urban land uses on water resources, and on other resources affected by or dependent upon these resources.

More often than not, in controversy on a specific area, the issue is posed in terms of the conflicting ambitions of a zoning applicant and adjacent property owners. Problems of neighborhood esthetics and property values, sanitary service, traffic loads, demands on the school system are often considered. But characteristically minimized—or simply missing—is the relationship between the alternative land uses and their effects upon water and related resources.

We permit subdivisions on critical watersheds of our surface waters, and on recharge areas of aquifers. We clear and build on steep slopes, substituting asphalt and bluegrass for hardwood forests.

We build on floodplains and potential reservoir sites. We drain wetlands and marshes with little regard for their water retention capacity, and replace them with houses, streets, and impervious fill.

And everywhere along our coastlines, in the estuaries and in the shallow bays and backwaters which are critical habitat for many fishes and crustaceans and waterfowl—as well as prime public recreation areas—we accept the final accumulation of our mistakes upstream, compounded by new indignities performed on the shores.

By failing to recognize and act upon basic ecological principles we may waste water, cause both floods and water shortages, and destroy or damage land and related resources of high value for conservation, scenic, and recreation purposes.

If we are to expect public officials and private landowners and developers to use urban lands with a sensible regard for effects on water and related resources, we will have to offer definitive guidance.

Responsible urban land use planners, public and private, want to know how runoff or recharge may be affected by converting a ridge from forest to forest estates.

Both land use planners and wildlife interests want to know more about the effects of wetlands and marshes on water regimen—although for different reasons.

We need ways to measure accurately runoff and sedimentation from various soils and slopes disturbed by highway and home and industrial and road construction.

Ecologists, soils scientists, hydrologists, foresters, wildlife and fisheries biologists, land use planners, land use economists, landscape architects, engineers, oceanographers, private developers, and other disciplines have something to contribute to developing guidelines in this area. Some researchers in each of these fields can be found through the existing centers. But we suggest that an orderly program addressed to a problem of this diversity is likely to require the talents of researchers in a number of private and public institutions.

In addition to studies of physical phenomena relating to water and related land use in urban areas, we need parallel studies of the social and legal political and economic factors which govern our effectiveness in applying what we know.

Planning coordination is an ancient but still troublesome problem. Through a variety of devices—interstate compacts and commissions, interagency committees, and others—we are developing a number of choices of ways of coordinating Federal-State planning of major river basins.

Largely under the stimulus of the Public Law 566 program, we have developed techniques for intergovernmental and government-private cooperation on rural small watersheds. This program has also succeeded in encouraging cooperation among rural and urban interests for certain purposes, notably for flood and erosion control.

But by and large, our planning and coordinating mechanisms simply do not provide for orderly consideration in urban areas—where a variety of local governments, and State and Federal agencies may be involved—of the range of water resource uses and values and alternatives deserving of attention.

The tangle of competing and conflicting proposals which arose after the 1965 flood on the South Platte River in the Denver metropolitan area illustrates the difficulty of developing a coherent and balanced program. Before the bridges over the Platte were restored to traffic, the people had been hopelessly confused by paucaes from a dozen sources. In the absence of a coordinating mechanism broadly representative of the affected jurisdictions and levels of government—as well as private interests—the public was forced to choose sides among incomplete and frequently self-serving solutions.

And the prospect of building an informed consensus out of the tragedy was damaged, perhaps irreparably, as a result.

We stress this obvious and somewhat tedious point, Mr. Chairman, to underscore our feeling that the effort to use our water resources sensibly is as likely to fail through a failure of our political institutions as our technology.

The broadening of assistance proposed by title II—to include local governments, State agencies, Federal agencies, nonland grant universities and private organizations and institutions—should better equip the administrators of the act to encourage a balanced water resources research program.

We appreciate the opportunity to express our views on S. 22.

SELECTED LIST OF STUDIES AND PUBLICATIONS ON WATER AND RELATED RESOURCES SUPPORTED BY OR CARRIED OUT BY THE CONSERVATION FOUNDATION

Books and reports

"The Flood Control Controversy—Big Dams, Little Dams, and Land Management." By Luna B. Leopold, hydraulic engineer, U.S. Geological Survey, and Thomas Maddock, Jr., hydraulic engineer, U.S. Bureau of Reclamation. The Ronald Press Co., New York, 1954; 19 illustrations, 12 tables, 278 pages; \$5.

A study of national flood-control programs and policies designed to provide the general reader with a critical analysis and the background of the current controversy. This study is primarily a description and evaluation of past, present, and prospective flood-control programs of the Corps of Engineers, U.S. Army, and the Department of Agriculture.

"The Conservation of Ground Water—A Survey of the Present Ground Water Situation in the United States." By Harold E. Thomas, U.S. Geological Survey. McGraw-Hill, New York, 1951; 4 maps, 327 pages; \$8 (out-of-print).

This summation of the national ground water situation is based on over 70 case studies of important ground water areas in 35 States.

"Vegetation and Watershed Management—An Appraisal of Vegetation Management in Relation to Water Supply, Flood Control, and Soil Erosion." By the late E. A. Colman, Chief, Division of Forest Influences Research, California Forest and Range Experiment Station, U.S. Forest Service, Berkeley. The Ronald Press Co., New York, 1953; 41 pages; \$8.

This book is a comprehensive study of these questions: What is the role of vegetation management in relation to water supply? Can vegetation be controlled to aid in the reduction of floodflows and soil erosion?

"Water Facts for the Nation's Future—Uses and Benefits of Hydrologic Data Programs." By W. B. Langbein, U.S. Geological Survey, and W. G. Hoyt, U.S. Geological Survey, retired. The Ronald Press Co., New York, 1959; 24 figures, 274 pages, \$5.

A diagnosis and recommendations concerning current practices and programs for collecting and utilizing basic information about the Nation's water resources.

"Fresh Water From the Ocean—For Cities, Industry, and Irrigation. By Cecil B. Ellis, and members of Nuclear Development Associates, White Plains, N.Y. The Ronald Press Co., New York, 1954; 41 illustrations, 9 tables, 220 pages, \$6 (out of print).

The early research study examines systematically the fundamental physics of the sea water conversion problem. In terms of a projected production of

1,000 million gallons per day (the water needs of New York City), all major cost elements are estimated—plant construction, operation, labor, maintenance, raw materials, and power needs.

"Law of Water Allocation in the Eastern United States." Edited by David Haber, professor of law, Rutgers University Law School, and S. W. Bergen, the Conservation Foundation staff. The Ronald Press Co., New York, 1958; 666 pages, paper cover \$7.50.

Twelve papers, and discussions by 50 participants, of a symposium on conflicts of interest over water rights in the Eastern United States, and on ways of adapting present laws to meet new conditions of water use.

"Report on the Allagash to the Natural Resources Council of Maine." The Conservation Foundation, December 1961; 181 pages, processed.

A marshaling of facts and factors important to an evaluation of several proposals to assure preservation and development of recreational and economic values in the area.

"Living Resources of the Sea—Opportunities for Research and Expansion." By Lionel Walford, Chief, Branch of Fishery Biology, U.S. Fish and Wildlife Service. The Ronald Press Co., New York, 1958; 13 tables, 315 pages, \$6.

This book deals with the broad question of how yields of food and materials from the sea might be radically increased. Its thesis is that extensive basic studies of marine organisms and environments are an indispensable first step, for both more efficient exploration and conservation.

"Politics and Conservation: The Decline of the Alaska Salmon." By Richard A. Cooley, Conservation Foundation Alaska Research Center.

The author traces development of Federal policies for conserving Alaska salmon in order to see how they came about, major forces that have shaped them, and why they have been so ineffective. The aim was not to produce a historical narrative but greater insight into the politics of the salmon fisheries, a major source of income in the State of Alaska.

In preparation

"Watershed Management." By Bernard Frank and Robert Dils. A textbook on modern watershed management practice and method.

Studies now underway

"The Atlantic Salmon." This is a study of the status of Atlantic salmon management and restoration both here and abroad, based on extended travel, interviews and analysis of the successes and failures of varying approaches to salmon conservation in a number of countries. Mr. Netboy's book is directed to the lay audience, but should also be useful to biologists as a literate interpretation of technical international experience.

"Alpine Watershed Ecology." An ecological study of a watershed is nearing completion under the direction of William Osburn, associate director of the Institute of Arctic and Alpine Research, University of Colorado. The study concentrates on water distribution in the Rocky Mountain alpine region, but he and his collaborators are also reporting on alpine soils and seedling growth, grazing, mountain insects and birds, energy and radioactive fallout patterns in alpine regions. A final chapter will discuss the impact of human beings on alpine ecosystems. The book will include a comprehensive bibliography of North American alpine tundra literature.

"Tidal Marshland Survey." Dr. Lionel Walford, author of "The Living Resources of the Sea," published by the foundation in 1955, has consented to provide guidance and direction for a 15-month comprehensive survey of the Atlantic estuarine and tidal marshland zone. The study will evaluate the consequences of recent encroachments on the zone and suggest needed land planning approaches and conservation measures. Walford will be assisted by a team of four assistants.

Films

"Living Water Series." Distributed by Encyclopaedia Britannica Films, Inc., Wilmette, Ill., 1952.

"The Pond and the City." Distributed by Encyclopaedia Britannica Films, Inc.

A comparison of the life in a pond with the life in a city. The mechanism of food supply, waste disposal, and so forth, which are largely self-regulating in a pond become problems and potential hazards to life and beauty in the city.

STATEMENT OF BERNARD J. WACHTER, EDITOR, INDUSTRIAL WATER ENGINEERING MAGAZINE

Having carefully evaluated the subject act from the standpoint of its meaning to industry, I have concluded that it provides the broad framework to sustain and coordinate the development of basic information on water. In supporting this conclusion I will comment on titles I and II separately since—as it should be—one begins where the other leaves off.

My comments here are those of an editor who, like a honey bee, taps many sources for material (and hopefully, effects some cross-pollination in the process). My views, therefore, are derived from contact with many people involved in water research, engineering, and management. While there is no industry consensus on the subject of water management, close examination reveals some basic needs, problems and capabilities in the field. These basics, I believe, relate to and are consistent with the objectives of this act.

MAJOR PREMISES

Title I.—This is a small step—although one in the right direction—to establish centers of competence in universities with locations appropriate to the geographic variations in water conditions. It does not overlap with the responsibilities of existing Government agencies but, rather, can provide much needed support for Government, agriculture and industry water programs by training personnel with the “broad view” of water management.

Title II.—Much of the know-how and competence in water research and management now resides in industry, agriculture, private research institutions and in the minds of nonuniversity people. Tapping these sources is important to prevent duplication of effort and to help implement title I by providing many missing pieces in the complex jigsaw puzzle of water management.

TITLE I

Ask any manager concerned with water what his biggest problem is and the odds are 8 to 3 he'll say, “Finding enough qualified people to do a job.” With the population soaring and machines releasing more “people time,” the manager, like Diogenes, wanders through the crowd looking for people. This is a paradox of the times.

Nowhere is the shortage of qualified people more acute than in the field of water research and management. To use an old cliché, water experts are made, not born. And right now they just aren't made fast enough or in sufficient quantity. There are several reasons why.

The first is that water studies, to a large extent, are part-time jobs. They are often handled as only part of a planning or construction project. Research is often specialized in scope, having little coordination with the overall water and waste water problems. This fragmented and part-time approach is not conducive to the development of water specialists with the “broad view.”

The second reason is that universities are not specifically preparing students for careers in water research and management. There is little intensive or extensive knowledge about water packaged in the typical college diploma. From the university standpoint, it makes little sense to have a student devote full-time study to prepare for a part-time job. Even civil and sanitary engineers, therefore, learn only certain aspects of water management.

Now consider the present situation in the country. We can predict with reasonable certainty where water problems will occur. They occur where qualified people do not have full-time and followthrough responsibility for water management. While large amounts of money and manpower are thrown into the breach to solve existing problems, this management by crisis has few sustaining benefits.

It makes sense to prevent rather than try to cope with problems after they occur. This involves training people now to handle the complexities of water and waste water management which are destined to increase in coming years. But it is not reasonable for universities to adopt a trade school attitude in training water specialists. Water is a social, economic, and political phenomenon as well as an engineering material. Students must, therefore, have a broad background to prepare them for the field.

It is for these reasons that I believe that the subject act is a good start in focusing an interdisciplinary lens on water research and management. Continued support of this program could eventually build up a reservoir of basic knowledge about water within the university and the surrounding agricultural, industrial, and governmental communities.

TITLE II

There's an old story about six blind men who encounter an elephant for the first time. Their descriptions of the animal vary widely depending on where they stand as they group around it. They have trouble deciding whether the elephant is coming or going.

The water situation in the country today has elephantine proportions. And as many individuals, groups, and organizations feel their way around it, their viewpoints differ, depending on their position in the picture. There is a helluva communications problem.

To illustrate this point, we stated during a meeting of scientists and engineers concerned with water research that 50 percent of the research scheduled for the next 5 years would turn up information which is already available. The over-generalization was deliberate—calculated to provoke discussion. Surprisingly the thought was not disputed.

Several of the scientists conceded that it is often easier to research a project than to piece together the data and ideas scattered in the literature. But the problem becomes more complex when the data and ideas are either not committed to writing or are confined within the structures of private institutions and organizations. This is like trying to work a jig-saw puzzle with many of the pieces missing or hidden.

We recognize that title I presumes reasonable cooperation among universities and other communities of interest. But it is not likely that an industrial concern, for example, would be inclined to cheerfully contribute important data, developed at significant cost, if this were of value to its competitors. This is especially true since intracompany data must be processed to be meaningful and the time and effort spent on this is costly.

It long has been contended that private organizations have an innate interest in using Government money to further their own ends. On this point I would concede that virtually every action, private or corporate, is motivated by self-interest. But in the area of water studies it has been my experience that individual companies prefer to pay for the solutions to their own in-plant water problems; and industry groups prefer to handle common water problems through cooperative financing.

It is in the area of basic water studies which provide information of value not specifically for industry but for the public at large, however, that industry cannot be expected to perform services gratis. And it is this area of water research which lies within the domain of the subject act. It is understandable that non-university grants are more difficult to administer under the specter of public criticism but this problem should be only a secondary consideration in evaluating the merits of title II.

My past experience with grants and contracts for water research indicates that industry is willing to give more than they get. Title II provides the mechanism to tap this mine of know-how and experience in the important field of water management.

NATIONAL RECLAMATION ASSOCIATION,
Washington, D.C., February 14, 1966.

Congressman WALTER ROGERS,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, Washington, D.C.

DEAR CONGRESSMAN ROGERS: The Congressional Record for February 10 gives notice that the Subcommittee on Irrigation and Reclamation will meet on February 14 and 15 to consider S. 22 and related bills to promote water research. In this regard, the National Reclamation Association wishes again to record its belief that further research can result in improving the efficiency of the collection, distribution, and use of water in the semiarid areas. Toward that objective, the association contributed to the findings of Senate Document No. 59, published September of 1959.

Since the publication of that document, the accelerating movement of populations westward, and especially into the Southwest area, have heightened the need for intermediate and long-range plans to import water. Preliminary investigations indicate that each additional increment of imported water will cost substantially more than the earlier one. It therefore appears that research along the following lines should be accelerated:

- (1) Research on the hydrological problems of watersheds of the Southwest.
- (2) Examination of the consumptive use of differing agricultural products and the optimum soil-moisture levels for each.
- (3) Examination of the times during plant growth at which a given unit of water will produce the greatest benefit.
- (4) Examination of means for sealing ponds, canals, and ditches to control seepage.
- (5) Continuing examination of means to reduce the evaporation from water surfaces.
- (6) The examination of more effective means for utilizing for irrigation the effluent from communities.

The foregoing itemization is not intended to indicate that research need be accelerated only toward those objectives. The purpose is merely to highlight the requirements in that area where migrations from the Midwest and the East are the heaviest. I therefore note the broader requirement as stated in the final paragraph of the attached resolution. This resolution was adopted in open convention at Kansas City in early November of 1965. With thanks.

Respectfully,

CARL H. BRONN, *Executive Director.*

RESOLUTION No. 65-14. SOIL AND WATER RESEARCH

Whereas the production from irrigated lands has and will continue to augment the diversity of food necessary for our growing Nation; and

Whereas more efficient use of water and land resources is imperative to the optimum development of our Nation, and

Whereas the problems of proper land use and water supply, quality, distribution, and reuse are as of as much importance to irrigated agriculture as they are to other water and land uses and the presently unknown interrelationships of; such joint uses can be determined by adequate and timely research; and

Whereas soil and water research has been grossly underfinanced in view of the problems and projected public demands: Now, therefore be it

Resolved, That the National Reclamation Association encourage and actively support action leading to the procurement of research funds from any source which will accomplish a better understanding of the problems and interrelationships of water supply, quality, distribution, conservation, and reuse as related to proper land husbandry and human needs—targeted toward the goal of meeting the spiraling demands for food and fiber and the expanding water needs of our Nation, and will support to early completion of the projects outlined in Senate Document 59, 86th Congress.

SPORT FISHING INSTITUTE,
Washington, D.C., February 14, 1966.

HON. WALTER ROGERS,
Chairman, Subcommittee on Irrigation and Reclamation, House Committee on Interior and Insular Affairs, Washington, D.C.

DEAR CHAIRMAN ROGERS: The Sport Fishing Institute has long been interested and forcefully involved in promoting use of proper water quality criteria in a standards program to help provide the best aquatic organizational objective, to help provide more and better fishing opportunity for some 60 million sport fishermen in these United States, we strongly supported the Water Quality Act of 1965.

We were also much concerned with the Water Resources Research Act of 1964 (Public Law 88-379) and did object originally to section 200 of that act. Therefore, we favor the repeal of that section as proposed by S. 22 of the 89th Congress, 1st session. We support your committee's proposal to extend the initial appropriation from \$1 million to \$5 million in fiscal year 1966, with a \$1 million annual increase over the next ensuing 5 years and \$10 million annually thereafter. This would provide for more adequate grants to be made from these funds for

contracts or other arrangements with educational institutions, private foundations, private firms and individuals, and with other governmental agencies to finance research in the aspects of water problems related to the mission of the Interior Department. This is a far more realistic approach, considering the use of these funds by the 50 States involved and the timely need to define suitable water quality criteria for use in developing standards for compliance with the Water Quality Act of 1965 by the States.

Unfortunately, there is a current scarcity of persons well enough versed in adequate ecology and water technology that they can serve the needs of both the Federal Government and their own States as experts to help establish these water quality criteria and standards. The membership of the American Fisheries Society probably furnishes the only concentration of well-informed aquatic resource scientists. S. 22 could help immeasurably to sustain this lifeline of essential trained water resource experts.

Each of the four parts of S. 22 that suggest amendments to the original Water Resources Research Act of 1964 propose favorable activities to establish a substantial Federal aid program at educational institutions within the provinces of the 50 States. Therefore, the Sport Fishing Institute wishes to be recorded in the testimony presented your subcommittee as favoring the amendments suggested in S. 22.

Thank you, Mr. Chairman.

Sincerely,

PHILIP A. DOUGLAS, *Executive Secretary.*

WILDLIFE MANAGEMENT INSTITUTE,
Washington, D.C., February 15, 1966.

HON. WALTER E. ROGERS,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, Longworth House Office Building, Washington, D.C.

DEAR CONGRESSMAN ROGERS: The institute wishes to express its support for the objectives of S. 22 that would amend the Water Resources Act of 1964 so as to facilitate the purposes of that most worthwhile act.

The improvements suggested by S. 22 would (1) helpfully redefine the category of private firms and individuals to which Federal assistance may be provided for essential water resources research; (2) strike the proviso which now requires that water research grants or contracts adjudged proper and appropriate by the Secretary of the Interior must be submitted to the House and Senate Interior Committees 60 days prior to the appropriation of funds; and (3) establish a new schedule of Federal financial support for the administration of the act.

The institute believes that the suggested amendments would appropriately expand and strengthen the administration of the act and would stimulate more public and national benefits in the terms of the intensification of water resources research and the yielding of useful results. We are pleased to note that these recommendations are consistent with the report of the special panel convened to review operations of the Office of Water Resources Research to the Department of the Interior, under date of January 5, 1966.

I would appreciate having this letter made a part of the hearing record.

Sincerely,

C. R. GUTERMUTH, *Vice President.*

NATIONAL WILDLIFE FEDERATION,
Washington, D.C., February 10, 1966.

HON. WAYNE N. ASPINALL,
Chairman, House Committee on Interior and Insular Affairs, Longworth House Office Building, Washington, D.C.

DEAR MR. CHAIRMAN: Thank you for the invitation and opportunity of commenting upon S. 22, to promote a more adequate national program of water research. We would appreciate having this letter made a part of the record of the current hearings.

The National Wildlife Federation is in accord with and supports the principles expressed in S. 22, which are (1) increasing the grants authorizations for appropriations from \$1 million annually for 10 years to \$10 million annually, be-

ginning at \$5 million and accelerating to the maximum at the rate of \$1 million annually; (2) eliminating a 10-year limitation on the program; (3) expanding the research program to institutions and groups other than land-grant colleges; and (4) dropping the requirement for legislative review of grants, contracts, and other arrangements.

In our opinion, the water research program is off to a good start, one which merits the expansion contemplated in S. 22. There is little question that additional research should be performed in many areas of water use and grants should be made to a wider field of activities. There is equally little question that much of the research will be on a longtime basis for which a continuing program is necessary. Finally, we are confident that the House and Senate Committees on Interior and Insular Affairs can have easy access to information on grants, in order to take any action they may deem necessary, without the need for specific legal direction such as that which has been the subject of controversy, and which would be stricken with adoption of S. 22.

In summary, we hope the committee soon can join the Senate in approving of this proposal.

Sincerely,

THOMAS L. KIMBALL, *Executive Director.*

TEMPORARY STATE COMMISSION ON WATER RESOURCES PLANNING,
Albany, N.Y., February 10, 1966.

HON. WAYNE ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
U.S. Congress,
Washington, D.C.

DEAR MR. CHAIRMAN: It is my privilege to write you to express the support of the temporary State commission on water resources planning, a body of the New York State Legislature, for S. 22, a bill to amend title II of the Water Resources Research Act of 1964 (Public Law 88-379). We also favor the companion bills introduced in the House by Congressmen O'Brien and Handley, both of New York State.

The major concern of this commission is to see that the people of the State of New York are assured, today and in the future, of an adequate supply of clean water. In order to do this, it is quite clear, based on the years of investigation by this legislative body, that we have to seek a great deal of new knowledge in the area of the physical, biological, and social sciences in relation to water resources.

S. 22 creates new and additional opportunities for public and private universities; qualified private research organizations; and Federal, State, and local governments to undertake broad research in support of the objective of seeking new knowledge.

This commission is already cooperating with the Cornell University Water Resources Center and its director, Leonard B. Dworsky, in furthering studies of water law in New York State under the matching grants provisions of title I of the act. We believe that the proposed amendments to title II will make possible a major advance in the objectives of your committee for safeguarding the water resources of the Nation and with respect to New York State.

Sincerely yours,

ALBERT J. HAUSBECK, *Chairman.*

Mr. WHITE of Idaho. All of the submitted letters are favorable to the enactment of H.R. 3606. Without objection the statements of Dr. E. A. Walker and Dr. F. P. Thieme, who were scheduled to appear with Dr. Morgan but were unable to be present, will be placed in the record following Dr. Morgan's appearance. (See pp. 66 and 67.)

Is there any further business to come before the committee?

If not, the Subcommittee on Irrigation and Reclamation will stand adjourned, subject to the call of the Chair.

(Whereupon, at 4:30 p.m., the committee adjourned, subject to the call of the Chair.)

(The testimony of the hearing on February 18 is inserted beginning on p. 97.)

LEGISLATIVE HISTORY

Public Law 89-404
S. 22

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INDEX AND SUMMARY OF S. 22

Jan.	6, 1965	Sen. Anderson introduced and discussed S. 22 which was referred to Senate Interior and Insular Affairs Committee. Print of bill and remarks of Sen. Anderson.
Jan.	26, 1965	Rep. O'brien introduced H. R. 3606 which was referred to House Interior and Insular Affairs Committee. Print of bill as introduced.
Mar.	16, 1965	Senate subcommittee approved S. 22.
Mar.	17, 1965	House subcommittee approved H. R. 3606.
Mar.	22, 1965	Senate committee reported S. 22 with amendment. S. Report 127. Print of bill and report.
Mar.	25, 1965	Senate passed S. 22 as reported.
Mar.	26, 1965	S. 22 was referred to Senate Interior and Insular Affairs Committee. Print as referred.
Mar.	23, 1966	House committee voted to report H. R. 3606.
Mar.	26, 1966	House committee reported H. R. 3606 with an amendment. H. Report No. 1350. Print of bill and report.
Mar.	29, 1966	House Rules Committee reported resolution for consideration of H. R. 3606. H. Res. 801, H. Report 1380. Print of resolution and report.
Mar.	30, 1966	House passed S. 22 with amendment (after substituting language of H. R. 3606. H. R. 3606 was tabled due to passage of S. 22.
April	5, 1966	Senate concurred in House amendment to S. 22.
April	19, 1966	Approved: Public Law 89-404.

Hearings: S. committee on S. 22
H. committee on H. R. 3606

DIGEST OF PUBLIC LAW 89-404

AMENDMENTS TO WATER RESOURCES RESEARCH ACT. Amends the Water Resources Research Act of 1964 to increase the Title II appropriations authorization to \$5 million for fiscal year 1967, and increase it by \$1 million each year, from 1972 through 1976, to a total authorization of \$85 million in a 10-year period. Deletes the provision allowing the House or Senate Interior and Insular Affairs Committee to veto grants, but requires financing arrangements to be submitted to Congress at least 60 days before they are effective. Deletes the prohibition against supporting research at educational institutions which obtain Title I aid for water research centers. Requires the Secretary of the Interior to submit an annual report to Congress on the implementation of the act by March 1 of each year.

S. 22

IN THE SENATE OF THE UNITED STATES

JANUARY 6, 1965

Mr. ANDERSON (for himself, Mr. BARTLETT, Mr. BAYH, Mr. BIBLE, Mr. BURDICK, Mr. CARLSON, Mr. GRUENING, Mr. HART, Mr. JACKSON, Mr. KUCHEL, Mr. LONG of Missouri, Mr. MANSFIELD, Mr. MCGEE, Mr. MCGOVERN, Mr. METCALF, Mr. MORSE, Mr. MOSS, Mr. TOWER, and Mr. YARBOROUGH) introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

A BILL

To promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 That (a) section 200 of Public Law 88-379 of the Eighty-
4 eighth Congress is repealed and

5 (b) That there is enacted in lieu thereof the following:

6 “SEC. 200. There is authorized to be appropriated to the
7 Secretary of the Interior \$5,000,000 in fiscal year 1966,
8 increasing \$1,000,000 annually for five years, and continuing
9 at \$10,000,000 annually thereafter from which he may make
10 grants, contracts, matching, or other arrangements with edu-
11 cational institutions, private foundations, or other institutions;

1 with private firms and individuals; and with local, State, or
 2 Federal Government agencies, to undertake research into any
 3 aspects of water problems related to the mission of the De-
 4 partment of the Interior, which may be deemed desirable and
 5 are not otherwise being studied.”

89TH CONGRESS
1ST SESSION

S. 22

A BILL

To promote a more adequate national program
of water research.

By Mr. ANDERSON, Mr. BARTLETT, Mr. BAYH,
 Mr. BIBLE, Mr. BURDICK, Mr. CARLSON, Mr.
 GRUTENING, Mr. HART, Mr. JACKSON, Mr.
 KUCHEL, Mr. LONG of Missouri, Mr. MANS-
 FIELD, Mr. McGEHE, Mr. MCGOVERN, Mr.
 METCALF, Mr. MORSE, Mr. MOSS, Mr.
 TOWER, and Mr. YARBOROUGH

JANUARY 6, 1965

Read twice and referred to the Committee on Interior
and Insular Affairs

terior—facilities which have increased the number of visitors to the Hatteras National Seashore, with no nearby metropolitan area, by 500 percent in a period of 10 years; facilities which can be expected to bring 3 million visitors a year to the Assateague National Seashore by 1975. Only through public development can we expect to provide for the greatest economic benefit to Worcester County and to Maryland from this, one of its most valuable assets.

A national seashore at Assateague will serve as a magnet for visitors which will increase each year. In view of the plans of the Department of the Interior for only minimum facilities on the island itself, the areas adjacent to the island will acquire an enormous potential for private development and growth. With this in mind, it is not too early for the citizens and officials of Worcester County, with the assistance of the State, to begin the preparation of a master plan for the development of facilities along the bay side of the county to service the island.

Mr. President, convinced of the importance of conserving for all time and for all people the unique natural features of Assateague Island, and for the many other reasons cited above, I lay before the Senate today a proposal which would place the entire 32 miles of the island in public ownership, and would make possible the comprehensive planning and development of this magnificent beach through joint State and Federal action.

Under this proposal, the Secretary of the Interior is authorized to acquire land, water, and other property within the boundaries of the seashore by donation, purchase, or exchange, or in such other manner as he shall find to be in the public interest, except that any property or interest owned by the States of Maryland or Virginia shall be acquired only with the concurrence of these States.

Mr. President, I want to take this opportunity to assure all Assateague Island property owners that every effort will be made to bring about negotiated settlements of land transfers, and that every property owner will be justly compensated.

Owners of improved property acquired by the Secretary may reserve a right of use and occupancy of the improved property for noncommercial purposes for a term of 25 years.

The Secretary is authorized and directed to compensate the State of Maryland in the amount of two-thirds of the cost of the bridge and its approaches presently under construction between Sandy Point and Assateague, and to pay a reasonable share of the cost of operation and maintenance of this bridge and its approaches. The State will thereupon reimburse Worcester County for its share of the cost of bridge construction.

The State of Maryland shall continue to own the area presently designated as a State park, and shall have the right to acquire from the Department of the Interior any additional area of the island northward from the State park as the

State may from time to time determine to be needed for State park purposes.

The Secretary of the Interior will administer the Assateague Island National Seashore for general purposes of public outdoor recreation, including conservation of natural features contributing to public enjoyment. The seashore will furnish unlimited opportunities for hunting, fishing, swimming, and boating, and the park will be open to the public at all times.

Mr. President, I want to take this opportunity to assure all Assateague Island property owners that every effort will be made to bring about negotiated settlements of land transfers, and that every property owner will be justly compensated.

Owners of improved property acquired by the Secretary may reserve a right of use and occupancy of the improved property for noncommercial purposes for a term of 25 years.

The Secretary is authorized and directed to compensate the State of Maryland in the amount of two-thirds of the cost of the bridge and its approaches, presently uncompleted, between Sandy Point and Assateague, and to pay a reasonable share of the cost of operation and maintenance of this bridge and its approaches. The State has agreed to reimburse Worcester County for the full share of its investment in the bridge construction and I have been advised by the Governor that the funds for this reimbursement will be included as part of the program he will present to the Maryland General Assembly later this month.

Since my introduction of the original legislation in September 1963, conferences with other members of the Maryland delegation, with representatives of Worcester County, and with the Department of the Interior have resulted in an amendment to the original bill. This amendment, which is included in the new bill as section 7, provides for selection of 600 acres of suitably elevated land for the construction by private interests of suitable overnight and other public accommodations for visitors to the seashore. These facilities will be subject to taxation by the State and by Worcester County. These facilities, those which are certain to be constructed on the adjacent mainland near the bridge terminus, and the anticipated influx of visitors from across the Nation, will surely mean an unprecedented increase in economic activity and tax revenues for Worcester County.

The State of Maryland shall continue to own the area presently designated as a State park, and shall have the right to acquire from the Department of the Interior any additional area of the island northward from the State park as the State may from time to time determine to be needed for State park purposes.

The Secretary of the Interior will administer the Assateague Island National Seashore for general purposes of public outdoor recreation, including conservation of natural features contributing to public enjoyment. The seashore will furnish unlimited opportunities for hunting, fishing, swimming, and boating, and the park will be open to the public at all times.

Mr. President, I introduced this bill in the 1st session of the 88th Congress. In spite of a crowded committee calendar, and the marathon debates which characterized the 88th, I received the utmost cooperation from my colleague, Senator BIBLE. As chairman of the Senate Subcommittee on Public Lands, the distinguished Senator from Nevada has performed a magnificent service to future generations of Americans through his careful protection of the great natural beauty of our country.

Through the cooperation of the chairman, the Assateague Island National Seashore proposal received a preliminary hearing on August 11, 1964. At that time, an early resumption of hearings was promised. Recent events have made immediate committee action essential if this great national resource is to be preserved for public enjoyment.

Private commercial developers have been pressing the State very hard for construction permits. The State, which is firmly behind Federal acquisition, has refused to grant the permits based on its ownership of State park land and the failure of developers to provide adequate sanitation plans. In an initial court test, the failure to grant permits has been reversed, and the State has appealed to Maryland's supreme judicial body. Permits will not be granted pending the outcome of this appeal.

The Maryland Court of Appeals is expected to rule early in 1965, perhaps as early as February or March. If the opinion of the lower court is sustained, there is little likelihood that private development can be forestalled. The millions of people living in Baltimore, Washington, Wilmington, and Philadelphia, and those additional millions who will visit the seashore annually, will have been deprived of an unprecedented recreational opportunity.

I hope the Congress can act in time.

Mr. President, I ask that this bill be allowed to lie on the table until the close of business on January 13 so as to give other Senators an opportunity to join as cosponsors.

The PRESIDENT pro tempore. Without objection, it is so ordered.

The bill (S. 20) to provide for the establishment of the Assateague Island National Seashore in the States of Maryland and Virginia, and for other purposes, introduced by Mr. BREWSTER (for himself and other Senators), was received read twice by its title, and referred to the Committee on Interior and Insular Affairs.

PROPOSED LEGISLATION RELATING TO WATER RESOURCES

Mr. ANDERSON. Mr. President, I am today introducing four bills in regard to water resources for myself and a number of cosponsors which constitute a rather broad research and planning program in that field. Three of the bills might be described as unfinished business from the 88th Congress, for they were before us last year. Two of the three have been passed by the Senate.

The four bills are the river basin planning bill; a measure to enact title II of

the Water Resources Research Act as it was adopted in the last Congress by the Senate but modified in conference; a measure to speed our program of weather modification research, experimentation and testing; and an amendment to the Saline Water Act.

I request that all these bills lie on the desk the remainder of this week to permit Senators who wish to join as cosponsors to do so.

The river basin planning bill, Mr. President, is S. 1111 of the 88th Congress as it was reported favorably to the House of Representatives by the House Interior Committee. It was slightly modified from the Senate version by the House committee to insure the orderly functioning of the river basin planning commissions. The amendments are acceptable. I understand the House committee chairman expects to take the measure up soon and hopes to report it to the House again at an early date. Inasmuch as it has once been approved by the Senate, I hope it will also be handled here without delay.

The planning bill accomplishes three things. It provides for a Federal Water Council composed of the Secretaries of Interior, Army, Agriculture, and Health, Education, and Welfare, and the Chairman of the Federal Power Commission. This Council has been functioning on an ad hoc basis for 4 years. The bill also authorizes the establishment of Federal-State river basin planning commissions where and when half the States involved and the Council agree that a Commission is desirable. Finally, it authorizes the appropriation of \$5 million annually for 10 years to assist State governments in planning for both intrastate and interstate waters.

The planning bill has the vigorous support of the Interstate Conference on Water Problems of the Council of State Governments, and many other groups.

The second bill I have introduced, to amend the Water Resources Research Act, restores the language of title II as we passed it in 1963 in this body.

Title II originally authorized the appropriation of \$5 million increasing \$1 million each year for 5 years to \$10 million annually, for the Secretary of the Interior to use to make matching agreements, contracts, grants or other arrangements with any colleges, universities, private institutes, foundations or firms or individuals with competence to undertake needed research on water problems.

The House of Representatives eliminated title II entirely from the bill. It agreed in conference to restore an authorization of \$1 million each year for 10 years, subject to a preappropriation submission to Congress of research projects proposed to be undertaken with the funds. The President has objected to the proviso. Response to the act has indicated that the sums originally authorized can be fruitfully invested in research in this important area. Many of us feel that we should adopt the program as it was originally proposed.

Resolutions calling for amendment of the bill as I am now proposing have been passed by the Association of State Uni-

versities and Land Grant Colleges, by the Interstate Conference on Water Problems of the Council of State Governments, by a group of colleges and universities in the New England area which conferred on water problems at Cornell University in New York in September, and by a group of foundations and research institutes, including Stanford Research Institute of California and the Illinois Institute of Technology—formerly the Armour Foundation—which met in December at the Brookings Institution here.

The response to the Water Resources Research Act has been very great. The bill as enacted authorized a basic grant to one college or university in each State to help finance a water resources research institute or center, plus matching funds for specific research projects. I am advised that 43 States have already filed applications for their basic grants and that the other 7 have advised the Office of Water Research that they will do so shortly.

The bill was patterned very closely after the Hatch Act of 1887 which established the Agriculture Experiment Stations. That act provided basic grants to each State, then matching funds. In the first year of the Hatch Act, nine States qualified. It was 6 years before all had qualified. We may very well have all 50 of our States qualified for water research work in the first year of operation under S. 2 of the 88th Congress.

In addition to the title I response, I am told that more than 30 research projects have been submitted for assistance under title II. This has been done in spite of the administration's reluctance to implement the title II program until it has been amended.

This response to the act, Mr. President, is proof of nationwide concern with water problems, of a recognition of their importance by our institutions of higher education, and of their willingness to assign some of their most competent personnel to research in the field and to the training of more hydroscintists, who are urgently needed.

The Senate can take a good deal of pride in this Senate-originated measure, and in other water legislation recently enacted and in the process of enactment. These bills stem from the work of the Senate Select Committee on Water Resources, which was proposed by Senator MIKE MANSFIELD in 1959, and chaired by the late Senator Robert S. Kerr, of Oklahoma. The select committee did an outstanding job, giving this body, and the Nation, a much needed understanding of the critical nature of our water problems, and the broad outlines of steps necessary for their solution.

The third bill which I am submitting is intended to speed up work on weather modification, and to provide for increased experimentation and field testing of weather modification procedures.

The Senate select committee, in making the Nation's first assessment or inventory of supply and requirements for water by regions, found that five major river basins in the Southwest and the upper Missouri Basin would be making full use of all water available to them

by 1980. By the year 2000, three additional areas, including the western Great Lakes region, will be at the end of their supply.

The problem of these areas is an additional quantity of water for all uses, to support economic growth.

Throughout the East, and especially in the great industrial area from New England south to Norfolk and then stretching in a band west to Sioux Falls, S. Dak., and Kansas City, quantity is not so great a problem as quality. There is a growing stringency for unpolluted, usable water supplies. A great deal of storage is going to have to be built in the East to store municipal water and to augment minimum flows for waste dilution.

Increased precipitation, either as rainfall or snowfall, will prove as helpful to the East in meeting dilution flow requirements within the next few years as to the arid Western States. Acceleration of weather modification studies, as proposed in the bill I am offering, is consequently of national interest. I hope it will not be regarded as a sectional matter.

We have two situations in the West which make weather modification experimentation there appropriate, in addition to our urgent need for water. There are large, sparsely settled or unsettled areas where experiments can be run with minimum danger of damage. We also have some fully developed river systems where reservoirs can catch and store all runoff waters regardless of when and where the precipitation occurs within the basins.

It is no longer necessary to make water fall on a specific farm or ranch at a specific time to give value to weather modification. With basinwide reservoir systems, clouds can be "milked" anytime they occur and the water stored. It is now obvious that within a generation or two we are going to have full development and control of most of the major river systems in the Nation. What we can develop now in the weather modification field will be of value throughout the Nation, and even the world, in a very few years.

Under the circumstances, the relatively small authorization proposed in this accelerated weather modification proposal is both timely and modest.

The last of the four measures I am offering is an amendment to the Saline Water Act.

For centuries men have tried to find a cheap way to make fresh water from the ocean. Shortage of pure water in arid areas, and periodic droughts have resulted in as serious disasters to the human race as has too much water in other instances.

With our increasing population, the seasons of drought, and the pollution of many of our water sources becoming a more serious problem as the years passed, President Truman in 1949 recognized that we had been doing too little to develop ways and means of desalting sea and brackish water. He recommended to the Congress that legislation be passed to provide a program of research and demonstration of practical means for

producing from sea or other saline waters, water suitable for beneficial consumptive use. The President had in mind a broad program, and visualized such a program as the only means by which early results could be obtained.

On the basis of President Truman's recommendation a bill was introduced in the House by Representative Clinton D. McKinnon, Democrat, of San Diego, Calif., and one by the late Senator O'Mahoney of Wyoming early in the 81st Congress. Hearings were conducted and a great deal of work was done on this legislation but the legislation died at the end of the 81st Congress.

Similar legislation was reintroduced in the 82d Congress by Senator O'Mahoney and the late Senator Engle, then Congressman from California. I conducted hearings in the Senate beginning March 15, 1951. The legislation was supported by the Department of the Interior. The Senate bill 5 was reported to the Senate and the Engle bill was passed by the House. When the House bill came to the Senate the language of S. 5 was substituted and the House bill approved and became Public Law 448 on July 8, 1952.

The President had recommended \$25 million for the program; however, the Congress chose to proceed more cautiously and approved only \$2 million for a 6-year program; \$175,000 of this was authorized for the fiscal year 1953.

Although this legislation was not what we hoped for, it was a beginning and in 1955 the Congress increased the authorization to \$10 million and extended the program from 6 to 14 years.

Three years elapsed during which it became obvious that private industry had perfected techniques and equipment for converting saline and brackish water which gave promise of meeting, at an early date, the goals of the saline water program.

The Department of the Interior now under a different management, seemed reluctant to move promptly to demonstrate processes that it had not generated from its own research, and there was no evidence of an energetic demonstration program being carried out by the Department of Interior.

Therefore, in 1958, after nearly a year of preparation, I introduced Senate Joint Resolution 135, "To provide for a full-scale demonstration plant for production from sea or other saline waters, of water suitable for agricultural, industrial, municipal, and other beneficial consumptive uses." This resolution authorized \$10 million for the construction of a full-scale plant. I stated at the introduction of this bill that we hoped to do in the saline water program, what we had done in the atomic energy program, and that is to demonstrate in an actual production test knowledge and equipment which had resulted to date from research, both public and private, into techniques of desalting water.

The task of getting this legislation finally approved was long and arduous. There was opposition from the Department of Interior. Those connected with the program wanted to hold the program to the former type of research pro-

gram and limit the size of plants to the degree that they would not be able to demonstrate on a large scale. After hearings and considerable work, the opposition of the Department of Interior to the demonstration idea was overcome. After being amended to provide for five demonstration plants, the bill was finally signed on September 2, 1958 and became Public Law 85-883.

This legislation did not end the research program but in effect it divided the overall saline water program into two parts: First, a research and development program, authorized by the act of July 3, 1952, and broadened by Public Law 84-111 in 1955; and second a demonstration plant program designed to produce the concrete results designed from the beginning.

Interest in the saline water program continued to spread throughout the United States and several foreign nations. In the 87th Congress, I sponsored a bill to provide for additional research and development in the saline water field. This included economic studies, studies of methods and uses of byproducts, development of plant processes and designs and annual reports with recommendations for location and operation of new demonstration plants. The law, as finally passed provided \$75 million for this program during the years 1962 through 1967. This was sponsored in the House by Congressman ASPINALL. The Senate proposed \$100 million for this program and the House \$50 million and the final act was a compromise between the House and Senate.

Some fine progress has been made with this program, but now we are ready to go on to bigger plants. The President has expressed a keen interest and strong support for this program and I understand that there will be some budget increase for the work. The Department of Interior has signed contracts for studies of conceptual designs for combination water desalting and power generating plants which would turn out 50 million gallons of fresh water per day. Even though we have made some fine progress there remain a great many problems and especially when we begin to move to plants that will produce 50 to 100 million gallons of fresh water per day. We are not sure what we will run into in these large plants in connection with such problems as heat exchanges, cost of pumping, pressures, and heavy scaling. These are mostly engineering problems but they must be solved and it will take additional money and time to build larger plants and work on these problems. I do not believe that we have any time to lose because the water shortages exist today.

The bill that I am introducing today will amend the Saline Water Act of September 22, 1961, in order to permit the acceleration of the saline water conversion program.

The PRESIDENT pro tempore. The bills will be received and appropriately referred; and, without objection, the bills will lie on the desk, as requested by the Senator from New Mexico.

The bills were received, read twice by their titles, and referred as indicated:

By Mr. ANDERSON:

S. 21. A bill to provide that the cost of certain investigations by the Bureau of Reclamation shall be nonreimbursable; to the Committee on Interior and Insular Affairs.

By Mr. ANDERSON (for himself, Mr. HART, Mr. EASTLAND, Mr. KUCHEL, Mr. METCALF, and Mr. MOSS):

S. 22. A bill to provide for the optimum development of the Nation's natural resources through the coordinated planning of water and related land resources, through the establishment of a water resources council and river basin commissions, and by providing financial assistance to the States in order to increase State participation in such planning; to the Committee on Interior and Insular Affairs.

By Mr. ANDERSON (for himself, Mr. BENNETT, Mr. BIBLE, Mr. CANNON, Mr. KUCHEL, Mr. MCGEE, and Mr. MCGOVERN):

S. 23. A bill to direct the Secretary of the Interior to conduct a program in five areas of the United States to increase usable precipitation, and for other purposes; to the Committee on Commerce.

By Mr. ANDERSON:

S. 24. A bill to expand, extend, and accelerate the saline water conversion program conducted by the Secretary of the Interior, and for other purposes; to the Committee on Interior and Insular Affairs.

GREAT SALT LAKE NATIONAL MONUMENT

Mr. MOSS. Mr. President, I am today introducing a bill to set aside part of Antelope Island—the largest island in Great Salt Lake—as a national monument. The National Park Service is wholly in accord with this proposal, and has already given a favorable report to an identical bill I introduced in the 88th Congress (S. 25).

Great Salt Lake is unique among American bodies of water. It possesses singular scientific and recreational attractions. Yet neither can be fully appreciated or enjoyed because they are not accessible.

Ever since our celebrated lakeshore resort, Saltair, was closed some years ago, facilities for bathing in the lake have been very limited. And nothing has been done to preserve and make accessible to all the tremendous geological story the lake has to tell, or to give to outdoor lovers the satisfaction that comes from viewing the vast panorama of the lake's windswept beaches and surrounding mountains from one of the islands.

A national monument on Antelope would restore and develop these striking values of Great Salt Lake. I propose that the monument embrace only the western side of the island, where the waters are deepest, and that the eastern side of the island, where on operating ranch is now located, be excluded, for the present at least. This would establish a national monument about 14 miles long and 4 miles wide, enclosing approximately 16,300 acres of land and 4,500 acres of water.

Within these boundaries would be enough of the rugged mountain range which runs down the center of the island to provide for an entertaining and educational display of the geologic history of the Great Basin area from the pres-

ent time back to the Ice Age. The monument would also embrace enough of the shoreline to allow for the establishment of suitable facilities for public bathing in the briny water which is unlike any this side of the Dead Sea, and for the construction of ramps so that boats could be launched into the dense blue water nearly one-third salt in content.

While Great Salt Lake is remarkable in itself, it is the key to a much broader geological study, as I have indicated. Schoolchildren are taught throughout our land that the lake is the remnant of vastly larger ancient lakes that were formed in the Great Basin during the Ice Age of the Pleistocene epoch, beginning roughly 1 million years ago and ending only about 10,000 years ago.

At different levels above the present surface of Great Salt Lake, the shorelines of the larger ancestral lakes occupying the area are easily recognized. These lake levels extend up across the beaches of Antelope Island and on up its rugged mountain range. Each lake level bears a different name—Bonneville, Provo, Stansberry, and Gilbert. The ancient lake which eroded the highest level has been named in honor of Capt. B. L. E. Bonneville who explored much of the area between 1832 and 1836. At its maximum size, Lake Bonneville occupied much of western Utah, and extended more than 300 miles from the extreme southern part of Idaho nearly as far as the Arizona boundary. The waters lapped against the Wasatch Mountains on the east and spread 180 miles to the west into Nevada. Its total area was approximately 20,000 square miles—more than twice the area of Massachusetts.

Geologists estimate that Lake Stansberry, corresponding to the shoreline 300 feet above the present lake, existed some 23,000 years, while Lake Gilbert existed a short time and shrunk to a level only about 400 feet above the present lake. This whole story is etched on Antelope Island.

For those who want scenery with their geology, the ravines between the peaks are filled with gray-green sage, service berries, and willows, and, in season, with starchroot, sunflowers, and wild roses. Mountain climbing and hiking are a challenge with a spectacular view in every direction. To the west is the burnt umber of the Oquirrh Mountains—to the east the smoky brown of the Wasatch Range, with towering snow-covered peaks of the Wasatch Front, a great geologic fault of ancient days.

The fascination of Great Salt Lake is well described in a magnificent book on it written by Dale L. Morgan. I quote him:

Visitors have called its waters bright emerald, grayish green, and leaden gray; they have called them sapphire and turquoise and cobalt—and they have all been right. Its colors vary with the time of day, the state of the weather, the season of the year, the vantage point from which it is seen. It can lie immobile in its mountain setting like a vast, green light-filled mirror or, lashed by a sudden storm, rise wrathful in its bed to assault boats and its shoreline with smashing 4-foot waves. The wind is its only master.

Thousands of Americans have seen the lake from the windows of a pullman car, as they crossed the Lucin Cutoff. This, Mr. Morgan holds, is to miss the real lure of the lake. He sums it up this way:

The feel of the sun and the salt on your skin, the wide sweep of the open sapphire sky, the strangely scented wind raucous with the screaming of the gulls, the intermingled beauty and striped ugliness of the lake and the shore * * * in all these things is something of the experience of great Salt Lake.

During the three centuries of written history, the lake has been a magnet for all types of men. Spaniards, mountain explorers, and other adventurers sought it out. For years this strange body of water beckoned the intrepid and the fearless. Many expeditions charted and studied it. Later the Mormons found it and in the Great Salt Lake Valley their promised land.

During the years of the westward migrations, the lake and the blazing salt deserts to the west of it formed a barrier to the march to California, lengthening the trail by many miles. Those who tried to cross the salt desert directly lost their wagons, their animals, and sometimes their lives, and wrote tragic chapters in pioneer history.

Years later—in your time and mine—these salt flats came into their own as an internationally famous track for the great auto racing meets beginning in the thirties. Speed records were broken then by Utah's own Ab Jenkins, and England's Sir Malcolm Campbell. Again this past fall the salt flats were the scene of new recordbreaking speed tests, with Art Arfons driving a car at an average speed of 536.71 miles an hour to break all previous world land speed records.

I began almost as soon as I came to the Senate 6 years ago to seek ways to develop the potential of Great Salt Lake. In both the 86th and 87th Congresses I introduced bills to establish a Great Salt Lake National Park, which would have included all of both Antelope and Fremont Islands, and a substantial portion of the lake itself. Hearings were held on this bill in Utah, and the support for it was overwhelming. I also requested that the National Park Service make an official survey of the area encompassed by the bill. Highly skilled people with years of experience in evaluating and developing park projects found the area of great interest. The National Park Service report made three special points:

First. Great Salt Lake illustrates outstandingly significant scientific values worthy of preservation and interpretation either by the Federal or State governments.

Second. No existing area in the national park system duplicates the values of Great Salt Lake.

Third. The north end of Antelope Island was the most impressive site for development.

When this report came out, I decided that a bill establishing a national monument on Antelope Island would make the most of the lake's potential, and eliminate any objection which might arise

from trying to incorporate sections of the lake precluded from recreation use because of industrial and municipal pollution. I introduced the first monument bill last session.

Construction of an improved access highway across the lake would bring Antelope Island within less than a 30-minute drive from Salt Lake City. My bill provides that the Secretary of the Interior may construct a causeway or causeways to the island. Because of the shallow water to the east and south, shoreline area roads could be built easily.

My bill would also permit the Secretary of the Interior to construct, operate and maintain boating and bathing facilities on the Antelope Island beaches. It likewise contains a section protecting all present rights of the State of Utah, its political subdivisions, and persons, to water flowing into the lake, to minerals there—including oil and gas—and to chemicals outside the monument boundaries. No effort will be made to control the lake level, and no requirements so to do may be laid on the National Park Service. The monument will not limit or impair private recreation facilities, nor mining of salt or other minerals elsewhere in the lake.

This Great Salt Lake Monument bill already has the support of the vast majority of the citizens of my State of Utah, and I am hopeful it will receive the support of the remainder of the country. It would preserve an area unduplicated in any of our other national parks or monuments for the wonderment and enjoyment of generations to come.

Mr. President, I send to the desk a bill to provide for the establishment of the Great Salt Lake National Monument, in the State of Utah, and for other purposes.

The PRESIDENT pro tempore. The bill will be received and appropriately referred.

The bill (S. 25) to provide for the establishment of the Great Salt Lake National Monument, in the State of Utah, and for other purposes, introduced by Mr. Moss, was received, read twice by its title, and referred to the Committee on Interior and Insular Affairs.

GOLDEN SPIKE NATIONAL MONUMENT

Mr. MOSS. Mr. President, I send to the desk, for appropriate reference, a bill to create a Golden Spike National Monument at Promontory, 30 miles west of Brigham City in Box Elder County, Utah.

It was at Promontory, as every schoolboy knows, that the first transcontinental railroad was completed on May 10, 1869. President Leland Stanford of the Central Pacific and Vice President Durant of the Union Pacific drove a golden spike to climax the road building race—1,800 hand-built miles of track in 6½ years.

The event fulfilled the dream of Columbus for a shorter route to the Orient, insured possession of the entire West for the United States and began a new era of development for the Nation.

89TH CONGRESS
1ST SESSION

H. R. 3606

IN THE HOUSE OF REPRESENTATIVES

JANUARY 26, 1965

Mr. O'BRIEN introduced the following bill; which was referred to the Committee on Interior and Insular Affairs

A BILL

To promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That (a) Section 200 of Public Law 88-379 of the Eighty-
4 eighth Congress is repealed; and

5 (b) That there is enacted in lieu thereof the following:

6 “SEC. 200. There is authorized to be appropriated to the
7 Secretary of the Interior \$5,000,000 in fiscal year 1966,
8 increasing \$1,000,000 annually for five years, and continuing
9 at \$10,000,000 annually thereafter from which he may make
10 grants, contracts, matching, or other arrangements with
11 educational institutions, private foundations, or other institu-

1 tions; with private firms and individuals; and with local,
 2 State, or Federal Government agencies, to undertake re-
 3 search into any aspects of water problems related to the
 4 mission of the Department of the Interior, which may be
 5 deemed desirable and are not otherwise being studied.”

89TH CONGRESS
 1ST SESSION

H. R. 3606

A BILL

To promote a more adequate national program
 of water research.

By Mr. O'BRIEN

JANUARY 26, 1965

Referred to the Committee on Interior and Insular
 Affairs

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C. 20250

Official Business Postage and Fees paid
U. S. Department of Agriculture

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

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For actions of March 16, 1965
89th-1st; No. 48

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HIGHLIGHTS: House Rules Committee cleared acreage-poundage tobacco bill. Senate passed bill to extend Manpower Development and Training Act. Sen. Talmadge urged adoption of direct payments farm program. Sens. Fulbright, Simpson, and Tower criticized proposed user charges on SCS technical assistance. Sen. Pearson introduced and discussed bill to restrict CCC sales of wheat. Sen. Magnuson introduced and discussed bill to authorize reimbursements and transfer of funds between appropriations. Reps. Redlin and Purcell introduced and discussed wheat bills.

SENATE

- 1. MANPOWER.** By a vote of 76 to 8, passed with amendments S. 974, to extend the Manpower Development and Training Act for four additional years, until June 30, 1970, to authorize appropriations of \$454 million for fiscal year 1966, and to transfer the training provisions of the Area Redevelopment Act to the Manpower Development and Training Act (pp. 5056,5058-82). By a vote of 35 to 49, rejected an amendment by Sen. Prouty which would have extended the program for only two years (pp. 5073-80).

2. WATER RESEARCH. The Irrigation and Reclamation Subcommittee of the Interior and Insular Affairs Committee approved for full committee consideration S. 22, to promote a more adequate national program of water research. p. D193
3. FARM PROGRAM. Sen. Talmadge urged adoption of a program of direct compensatory payments to farmers as a means of reducing surplus supplies of commodities, and inserted several items in support of his position. pp. 5024-6
4. USER CHARGES; SOIL CONSERVATION. Sens. Fulbright and Simpson expressed opposition to the proposed user charge on SCS technical assistance to farmers and ranchers, and Sen. Simpson inserted a speech by Sen. Tower critical of the proposal. pp. 5023-4, 5032-4
Received resolutions of the Idaho and Mo. Legislatures opposing the proposed SCS user charge. pp. 5006, 5006-7
5. ELECTRIFICATION. Sen. Metcalf inserted a speech by Rep. Moss before the NRECA annual meeting in Miami on "the importance of protecting consumers through the techniques of governmental regulation and the availability of a competitive yardstick for measuring the reasonableness of electric rates and services." pp. 5046-8
Received from the Federal Power Commission copies of publications, "Typical Electric Bill, 1964" and "Hydroelectric Plant Construction Cost and Annual Production Expenses, 1962-63." pp. 5005-6
6. SUGAR. Received a N. Dak. Legislature resolution favoring enactment of legislation to extend the Sugar Act to Dec. 31, 1970, to increase domestic sugar quotas, and to permit the domestic sugar industry to market the excess of sugar from the increased production of 1963-64. pp. 5008, 5011
7. FARM LABOR. Sen. Hruska disputed the "adamant insistence" of the Secretary of Labor that there is an adequate supply of domestic farm labor and inserted several items on the situation. pp. 5028-30
8. MARKETING. Sen. Neuberger spoke in support of proposed truth-in-packaging legislation and inserted an article discussing food industry opposition to such legislation. pp. 5048-50
9. FOOD; CONSERVATION. Sen. Boggs inserted a speech by Sen. Dirksen, "The State of the Union," in which he discusses various subjects, including world food problems, conservation of the soil, and the public debt. pp. 5001-5
10. TOBACCO. Received a Wash. Legislature resolution supporting enactment of legislation to require that cigarettes be labeled as hazardous to health. pp. 5007-8
11. BALANCE OF PAYMENTS. Sen. Robertson inserted a commentary by the chief economist of the Senate Banking and Currency Committee on the balance of payments situation. pp. 5027-8
12. FOREIGN TRADE. Sen. Lausche inserted a paper by Dr. Lev E. Dobriansky, professor of economics of Georgetown Univ., "Five Perspectives on East-West Trade." pp. 5030-2
13. FOREST RESEARCH. Sen. Byrd, W. Va., commended the establishment of the Forest Service's Forest Products Marketing Laboratory in Princeton, W. Va. pp. 5054-6

ney General, Lands Division, who was accompanied by Ralph A. Barney, both of the Department of Justice. Subcommittee adjourned subject to call.

WATER RESEARCH PROGRAM

Committee on Interior and Insular Affairs: The Irrigation and Reclamation Subcommittee, in executive session, approved for full committee consideration with amendment S. 22, to promote a more adequate national program of water research.

The full committee will meet on Friday, March 19, to consider this proposed legislation.

ECONOMIC CONCENTRATION

Committee on the Judiciary: The Antitrust and Monopoly Subcommittee resumed its long-range inquiry into economic concentration, with especial emphasis on the underlying structural aspects of concentration, receiving testimony from Dr. Willard F. Mueller, Director, Bureau of Economics, Federal Trade Commission.

Hearings continue tomorrow.

IMMIGRATION

Committee on the Judiciary: Subcommittee on Immigration and Naturalization continued its hearings on S. 500 and other pending legislation proposing amendments to the immigration and nationality laws, having as its witnesses Mario Biaggi, Columbia Association of New York; and James Read, president, Wilmington College of Ohio, representing Friends Committee on National Legislation.

Hearings continue tomorrow.

HIGHER EDUCATION

Committee on Labor and Public Welfare: Subcommittee on Education began hearings on S. 600, proposed Higher Education Act of 1965, receiving testimony from Secretary Anthony J. Celebrezze; and Francis Keppel, Commissioner, who was accompanied by Dr. Peter Muirhead, Associate Commissioner, both of the Office of Education, all of the Department of HEW.

Hearings continue on Monday, March 22.

House of Representatives

Chamber Action

Bills Introduced: 47 public bills, H.R. 6319-6365; 23 private bills, H.R. 6366-6388; and 2 resolutions, H.J. Res. 386 and H. Con. Res. 354, were introduced.

Pages 4999-5000

Bill Reported: One report was filed as follows: H.R. 398, to permit the discovery, location, development, and utilization of the mineral resources of certain public lands in national forests in the State of Colorado, amended (H. Rept. 174).

Page 4999

Speaker Pro Tempore: Heard the reading of a communication from the Speaker designating Representative Albert to act as Speaker on March 16.

Page 4933

Private Calendar: Passed the following bills on the call of the Private Calendar:

Sent to the Senate without amendment: H.R. 1224, 1309, 1381, 1867, 1870, 2881, 3051, 3096, 3111, 3536, 4024, 4025, and 4088.

Sent to the Senate, amended: H.R. 1217, 1453, 2139, 2354, 3074, and 3899.

Passed over without prejudice: H.R. 1218, 1291, 1356, 1374, 1380, 1384, 1445, 1475, 1487, 2155, 2166, 2299, 2681, 2924, 3075, 3076, 3137, 3634, 3638, 3685, 4026, and 4443.

Pages 4933-4939

Bennett Place Commemoration: Adopted without amendment S.J. Res. 48, to provide for Bennett Place (N.C.) commemoration, and thus cleared the legislation for the President.

Page 4939

Congressional Redistricting: After rejecting a recom-

mittal motion the House by a voice vote passed without amendment H.R. 5505, regarding establishment of Federal standards for congressional redistricting.

By a record vote of 147 yeas to 255 nays the House rejected an amendment providing that the number of Representatives that a State is entitled to may be elected at large pending reapportionment under this act; also providing for at-large elections in States that have never established districts.

H. Res. 272, the rule providing for the consideration of the legislation, had been adopted earlier by a voice vote.

Pages 4939-4960

Bills Referred: 12 Senate-passed bills were referred to appropriate committees.

Page 4998

Quorum Call and Record Vote: During the proceedings of the House today one quorum call and one record vote developed and they appear on pages 4939 and 4960.

Program for Wednesday: Adjourned at 5:50 p.m. until Wednesday, March 17, 1965, at 12 o'clock noon, when the House will consider H.R. 4185, to fix the fees payable to the Patent Office (2 hours of debate); and H.R. 5374, relating to salaries of Supreme Court Justices (1 hour of debate).

Committee Meetings

WATERSHED

Committee on Agriculture: Subcommittee on Conservation and Credit held a hearing on various watershed projects, and testimony was given by Representatives

Thompson of Wisconsin, Andrews of North Dakota, Gathings, Callan, and Burton of Utah.

Statements were presented for the record by Representatives Morris, Walker, Giaimo, Skubitz, and Udall.

ARMED SERVICES PROCUREMENT

Committee on Armed Services: Met in executive session and continued consideration of H.R. 4016, to authorize appropriation during fiscal year 1966 for procurement of aircraft, missiles, naval vessels, research, development, test, and evaluation for the Armed Forces. Heard Secretary of the Army Stephen Ailes; and Gen. Harold K. Johnson, Chief of Staff, Army.

SUBCOMMITTEE ASSIGNMENTS

Committee on Banking and Currency: The chairman today announced the appointment of the following subcommittees:

Subcommittee on Small Business: Representatives Multer, Barrett, Sullivan, Grabowski, Gettys, Ottinger, Cabell, Talcott, Del Clawson, Stanton, and Mize.

Subcommittee on Bank Supervision and Insurance: Representatives Moorhead, St Germain, Minish, Weltner, Grabowski, McGrath, Hansen of Iowa, Brock, Talcott, Del Clawson, and Johnson of Pennsylvania.

Subcommittee on Housing: Representatives Sullivan, Ashley, Moorhead, Stephens, St Germain, Gonzalez, Reuss, Widnall, Fino, Dwyer, and Harvey of Michigan.

Subcommittee on Consumer Affairs: Representatives Stephens, Gonzalez, Minish, Hanna, Grabowski, Todd, Annunzio, Dwyer, Fino, Halpern, and Stanton.

Subcommittee on International Finance: Representatives Multer, Ashley, Moorhead, Gonzalez, Hanna, White of Idaho, Ottinger, Halpern, Widnall, Harvey of Michigan, and Talcott.

Subcommittee on International Trade: Representatives Stephens, St Germain, Weltner, Gettys, Cabell, McGrath, Hansen of Iowa, Halpern, Talcott, Johnson of Pennsylvania, and Mize.

HIGHER EDUCATION

Committee on Education and Labor: Special Subcommittee on Education continued hearings on H.R. 3220 and H.R. 3221, regarding financial assistance for higher education. Testimony was given by public witnesses.

FOREIGN AID

Committee on Foreign Affairs: Met in executive session and continued on foreign aid, and heard Brig. Gen. Eugene L. Strickland, Regional Director, Near East, South Asia and Africa, Office of the Assistant Secretary of Defense for International Security Affairs, Department of Defense; and Gen. Robert J. Wood, Director of Military Assistance, Office of the Assistant Secretary of Defense for International Security Affairs, Department of Defense.

SINO-SOVIET DISPUTE

Committee on Foreign Affairs: Subcommittee on the Far East and the Pacific continued hearings on the Sino-Soviet dispute, and heard testimony from public witnesses.

BRIEFING—COMMUNISM

Committee on Foreign Affairs: Subcommittee on Inter-American Affairs met in executive session for a briefing by Jack H. Vaughan, Assistant Secretary of State for Inter-American Affairs, on communism in Latin America.

NATIONAL PARKS

Committee on Interior and Insular Affairs: Subcommittee on National Parks and Recreation continued hearings on H.R. 797, re Whiskeytown-Shasta-Trinity Recreation Area, Calif.; H.R. 500, re Agate Fossil Beds National Monument, Nebr.; and H.R. 3165, re Pecos National Monument, N. Mex. Testimony was given by Edward P. Cliff, Chief, National Forest Service, Department of Agriculture; other departmental witnesses; and public witnesses.

PRESIDENTIAL INABILITY

Committee on the Judiciary: Met in executive session and considered legislation regarding Presidential inability. No announcements were made. The committee will continue in executive session on this same subject Wednesday, March 17.

STEEL PIKE

Committee on Merchant Marine and Fisheries: Met for a briefing with Nicholas Johnson, Administrator, Maritime Administration; Vice Adm. John S. McCain, Jr., Commander, Amphibious Forces, Atlantic; Vice Adm. Glynn R. Donoho, Commander, Military Sea Transportation Service; Lt. Gen. J. P. Berkeley, Commanding General, Fleet Marine Forces; and public witnesses, on the participation and performance of American merchant ships in the recent Steel Pike amphibious operation off the coast of Spain.

SECOND-CLASS MAIL

Committee on Post Office and Civil Service: Subcommittee on Postal Operations met in executive session and ordered reported favorably to the full committee H.R. 459, to provide for more uniform application of section 4369 to title 39, U.S. Code, which pertains to filing of information relating to second-class mail publications.

The subcommittee also approved its program for this Congress.

WATER QUALITY

Committee on Public Works: Met in executive session to consider H.R. 3988, regarding the Water Quality

March 17, 1966

pp. 5870-2

13. ADJOURNED until Mon., Mar. 21. p. 5878

HOUSE

14. RESEARCH ANIMALS. A subcommittee of the Agriculture Committee approved for full committee action with amendment H. R. 12488, to authorize the Secretary of Agriculture to regulate the transportation, sale, and handling of dogs, cats, and other animals intended to be used for purposes of research or experimentation. p. D217
15. LABOR STANDARDS. A subcommittee of the Education and Labor Committee approved for full committee action H. R. 13712, amending the Fair Labor Standards Act to extend its protection to additional employees and to raise the minimum wage. p. D218
16. WATER RESEARCH. A subcommittee of the Interior and Insular Affairs Committee approved for full committee action with amendment H. R. 3606, to promote a more adequate national program of water research. p. D218
17. PERSONNEL; CONTRACTS. Received from the Post Office and Civil Service Committee a report entitled, "1965 Report of Statistical Activities of the Federal Government: Personnel, Equipment, and Contract Costs" (H. Rept. 1333). p. 5986
18. ECONOMIC REPORT. Received from the Joint Economic Committee its report on the January 1966 Economic Report of the President (H. Rept. 1334) (p. 5986) Rep. Patman commended the portion of the report "dealing with the maintenance of competition and enforcement of our antitrust laws" (pp. 5883-4)
19. PERSONNEL. The Rules Committee granted an open rule for the consideration of H. R. 10607, to amend the Administrative Expenses Act to provide reimbursement of certain moving expenses of employees. p. D219
20. TARIFF. The Ways and Means Committee voted to report (but did not actually report) the following bills: H. R. 8376, to amend title I of the Tariff Act of 1930 to make permanent the existing duty-free treatment for certain corkboard insulation; H. R. 10998, to continue for a temporary period the existing suspension of duty on heptanoic acid; H. R. 12328, with amendment, to extend for 3 years the period during which certain tanning extracts of hemlock or eucalyptus suitable for use for tanning, may be imported free of duty; H. R. 12461, to continue for a temporary period the existing suspension of duty on certain istle; H. R. 12463, to extend until June 30, 1969, the suspension of duty on crude chicory; H. R. 12864, with amendment, to extend for a temporary period the existing provisions of law relating to the free importation of personal and household effects brought into the U. S. under Government orders. p. D219
21. CORN. Rep. Nelson inserted a number of letters from country elevator operators complaining of the sale of CCC corn at "price-breaking levels" (pp. 5888-9), and defended his criticism of recent "dumping" of corn supplies against the remarks of Secretary Freeman that it was "political noise", and inserted charts and letters on the subject (pp. 5930-31),

Rep. Olson, Minn., expressed concern over CCC sales of corn but stated that he had assurance from this Department "that inventories of corn in Minnesota are sufficient to meet local demand." p. 5901

22. SCHOOL LUNCH; SCHOOL MILK. Rep. Fogarty criticized proposed reductions in the school lunch and milk programs and inserted a supporting article. p. 5907
23. DAIRY PRICES. Rep. Stalbaum and several other Representatives discussed the "urgency for increased price supports for dairy products." pp. 5913-16
24. FLOOD CONTROL. Rep. Edmondson spoke in support of his bill to prohibit certain fees being charged in connection with projects for navigation, and flood control. pp. 5919-21
25. FOREIGN AFFAIRS. Rep. O'Hara inserted the testimony of the executive director of the American Committee on Africa, before the Subcommittee on Africa of the Foreign Affairs Committee, in which he stated that the U. S. should disengage itself from the African economy and that the quota for South African sugar should be eliminated altogether. pp. 5897-01
26. INTEREST RATES. Rep. Patman criticized "tight money policy" and commended and inserted articles supporting his views. pp. 5882-3
Rep. Widnall discussed "indirect breeching of the 4½-percent Government bond interest ceiling" and urged that Congress give it critical examination. p. 5889
27. TRADE STATISTICS. Rep. Langen compared U. S. methods of computing foreign trade costs with that of other countries and stated that it has been revealed that our official foreign trade statistics are deceptive. p. 5902
Rep. Moore stated that he is introducing a joint resolution "calling on the Secretaries of Commerce and Treasury to place trade statistics before us that will reveal rather than conceal our competitive position in the world." p. 5906
28. POVERTY. Reps. Goodell and Gubser criticized administration of the poverty programs. pp. 5889, 5911-2, 5929-30
29. ALLIANCE FOR PROGRESS. Rep. Fascell cited accomplishments under the Alliance for Progress and reaffirmed personal commitment to the continued success of "this great hemispheric experiment in human cooperation." pp. 5907-8
30. EDUCATION. Rep. Green, Ore, inserted messages from educational institutions across the Nation indicating that cuts in the National Defense Education Act loans would seriously handicap our educational process and stated that the Special Subcommittee on Education had adopted a resolution expressing the determination to continue such loans without revision for the next fiscal year. pp. 5892-7
31. WORLD FOOD. Rep. Olsen, Mont., stated that "it is time to take a long, hard look at the restrictions we have imposed on our farmers" in view of the great world food shortage. p. 5941
32. FOREIGN CURRENCIES. Rep. Burleson inserted a report on the expenditures by various committees of foreign currencies and appropriated funds incurred in travel outside the U. S. pp. 5944-85

from Senator Morse; Prof. Louis L. Jaffee, Harvard University; and Dr. Edwin Palmer, chairman of board of trustees, Citizens for Educational Freedom.

Subcommittee recessed subject to call.

HEALTH

Committee on Labor and Public Welfare: Subcommittee on Health continued its hearings on S. 3008, proposed comprehensive health planning and public health services amendments of 1966, having as its witnesses Dr. Bartholomew Hogan, deputy medical director, Ameri-

can Psychiatric Association; Dr. Donald A. Galagan, dean, University of Iowa Dental College, representing the American Dental Association; Dr. Terrell V. Davis, Division of Mental Health and Hospitals of New Jersey, representing the Association of State and Territorial Mental Health Program Director; Dr. Helen B. Tausig, professor of pediatrics, emeritus, the Johns Hopkins University School of Medicine, representing the American Heart Association; and William P. McCracken, Jr., representing the American Optometric Association.

Hearings were adjourned subject to call.

House of Representatives

Chamber Action

Bills Introduced: 53 public bills, H.R. 13740-13792; 11 private bills, H.R. 13793-13803; and 52 resolutions, H.J. Res. 906-956, and H. Con. Res. 618, were introduced.

Pages 5986-5988

Bills Reported: Reports were filed as follows:

H.R. 7423, regarding transfers of Post Office Department appropriations by Postmaster General, amended (H. Rept. 1331);

H.R. 13448, regarding mailing privileges of members of the U.S. Armed Forces and other Federal Government personnel overseas (H. Rept. 1332);

Report of Statistical Activities of the Federal Government: personnel, equipment, and contract costs (H. Rept. 1333);

Joint Economic Report (H. Rept. 1334);

Report on Federal Reserve System—Check Clearance Float (H. Rept. 1335);

H.R. 5533, a private bill, amended (H. Rept. 1336);

H.R. 8219, a private bill, amended (H. Rept. 1337);

H.R. 8833, a private bill, amended (H. Rept. 1338); and

H.R. 10220, a private bill, amended (H. Rept. 1339).

Page 5986

Legislative Program: The legislative program for the week of March 21 to 26 was announced by the majority leader. Agreed to House adjournment from Thursday to Monday.

Pages 5881-5882, 5892

Calendar Wednesday: Agreed to dispense with Calendar Wednesday business of March 23.

Page 5882

Program for Monday: Adjourned at 2:31 p.m. until Monday, March 21, 1966, at 12 o'clock noon when the House will call the Consent Calendar and consider under suspension of the rules the following two bills, H.R. 7423, permitting transfers of Post Office Department appropriations by Postmaster General and H.R. 13448, providing airlift to armed services post offices on a worldwide basis.

Committee Meetings

ADMINISTRATIVE PROBLEMS

Committee on Agriculture: Subcommittee on Departmental Oversight met in open session and continued on administrative problems of local ASC committees. Testimony was heard from Department of Agriculture officials.

DOGS AND CATS

Committee on Agriculture: Subcommittee on Livestock and Feed Grains met in executive session and approved for full committee action H.R. 12488 (amended), to authorize the Secretary of Agriculture to regulate the transportation, sale, and handling of dogs and cats, and other animals intended for purposes of research or experimentation, a clean bill to be introduced.

HOUSING

Committee on Banking and Currency: Subcommittee on Housing continued hearings on H.R. 9256, to amend the National Housing Act to provide mortgage insurance, and authorize direct loans by the Housing and Home Finance Administrator, to help finance the cost of constructing and equipping facilities for the group practice of medicine or dentistry; H.R. 12341, to assist city demonstration programs for rebuilding slum and blighted areas, and for providing the public facilities and services necessary to improve the general welfare of the people who live in these areas; H.R. 12946, to provide incentives to planned metropolitan development and to otherwise assist in urban development; and H.R. 13064, to amend and extend laws relating to housing and urban development. Testimony was heard from public witnesses.

FEDERAL MUTUAL SAVINGS BANKS

Committee on Banking and Currency: Subcommittee on Bank Supervision and Insurance met in executive session on H.R. 11508, to authorize the establishment of

Federal mutual savings banks. No final action was taken. Adjourned subject to call of the Chair.

SCHOOL ASSISTANCE

Committee on Education and Labor: General Subcommittee on Education continued hearings on H.R. 13160 and H.R. 13161, identical bills, to strengthen and improve programs of assistance for our elementary and secondary schools. Testimony was heard from public witnesses.

HIGHER EDUCATION ACT

Committee on Education and Labor: Special Subcommittee on Education met in executive session and continued on H.R. 13174 and H.R. 13237, related bills, to strengthen and improve public and private programs of assistance for institutions of higher education and students attending them. No final action was taken.

Preceding the executive session the committee met in open session and heard testimony from public witnesses.

WAR ON POVERTY

Committee on Education and Labor: Ad Hoc Subcommittee on the War on Poverty Program continued hearings on poverty legislation. Testimony was heard from public witnesses.

FAIR LABOR STANDARDS ACT

Committee on Education and Labor: General Subcommittee on Labor met in executive session and approved for full committee action H.R. 13712, regarding amendments to the Fair Labor Standards Act.

FOREIGN ASSISTANCE ACT

Committee on Foreign Affairs: Continued hearings on H.R. 12449, to amend further the Foreign Assistance Act of 1961; and H.R. 12450, to promote the foreign policy, security, and general welfare of the United States by assisting peoples of the world in their efforts toward internal and external security. Testimony was heard from Dean Rusk, Secretary of State.

NATO BRIEFING

Committee on Foreign Affairs: Subcommittee on Europe met in executive session for a briefing on recent developments in NATO with Charles E. Bohlen, Ambassador to France.

U.S.-SOUTH AFRICA RELATIONS

Committee on Foreign Affairs: Subcommittee on Africa met in open session and continued the discussion on U.S.-South Africa relations. Testimony was heard from public witnesses.

ASIAN POLICY

Committee on Foreign Affairs: Subcommittee on the Far East and the Pacific met in executive session and continued on U.S. policy toward Asia. Testimony was

heard from William P. Bundy, Assistant Secretary of State for Far Eastern Affairs.

WATER RESEARCH

Committee on Interior and Insular Affairs: Subcommittee on Irrigation and Reclamation met in executive session and approved for full committee action H.R. 3606 (amended), to promote a more adequate program of water research.

AUTOMOBILE SAFETY

Committee on Interstate and Foreign Commerce: Continued hearings on H.R. 13228, the Traffic Safety Act of 1966; H.R. 12548, and related bills, regarding the National Traffic Safety Agency; H.R. 414, and related bills, regarding automobile safety; and H.R. 688, and related bills, regarding safety standards for auto tires. Testimony was heard from John T. Connor, Secretary of Commerce. Adjourned subject to call of the Chair.

ANNOUNCEMENT—HEALTH PROFESSIONS PERSONNEL TRAINING

The Committee on Interstate and Foreign Commerce announced that it will conduct public hearings on H.R. 13196, the Allied Health Professions Personnel Training Act of 1966, beginning on Tuesday, March 29, at 10 a.m., in room 2123 Rayburn House Office Building.

STATE TAXATION

Committee on the Judiciary: Special Subcommittee on State Taxation of Interstate Commerce continued hearings on H.R. 11798, the Interstate Taxation Act. Testimony was heard from public witnesses.

NARCOTIC ADDICTION

Committee on the Judiciary: Subcommittee No. 2 met in executive session and approved for full committee action H.R. 9167 (amended), to amend title 18, U.S. Code, to enable the courts to deal more effectively with the problem of narcotic addiction. Also heard testimony on private claims bills.

FOREIGN AGENTS REGISTRATION ACT

Committee on the Judiciary: Subcommittee No. 3 met in executive session on S. 693 and H.R. 290, related bills, to amend the Foreign Agents Registration Act of 1938. No final action was taken.

MERCHANT SHIPPING TO VIETNAM

Committee on Merchant Marine and Fisheries: Subcommittee on Merchant Marine continued hearings on the shipping situation in Vietnam. Testimony was heard from Vice Adm. G. R. Donoho, USN, Commander, Military Sea Transportation Service.

ARMED FORCES MAILING PRIVILEGES

Committee on Post Office and Civil Service: Met in executive session and ordered reported favorably to the House the following bills:

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE

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HIGHLIGHTS: Senate committee reported bill for expanded water research program. Sen. Talmadge urged direct payments program for cotton. Sen. Carlson inserted item on problems of farm cooperatives. Sen. Carlson inserted his address appraising postwar farm policies. Sen. Douglas introduced and discussed bill to provide efficient management of automatic data processing equipment.

SENATE

1. WATER RESEARCH. The Interior and Insular Affairs Committee reported with amendment S. 22, to promote a more adequate national program of water research (S. Rept. 127). p. 5310
2. WATER AND AIR POLLUTION. The Public Works Committee reported with amendments S. 560, to provide for improved cooperation by Federal agencies to control water and air pollution from Federal installations and facilities and to control automotive vehicle air pollution (S. Rept. 128). p. 5310
3. COTTON; WOOL. Sen. Talmadge commended and urged extension of the Wool Act, and urged enactment of legislation to provide a cotton program of direct compensatory payments to cotton farmers. p. 5324
4. FARM PROGRAM. Sen. Carlson inserted his address to the Farmers Union Cooperative Marketing Assoc. reappraising postwar farm policies and stressing "the great contribution that has been made by agriculture during the past two decades." pp. 5321-3
5. FARM COOPERATIVES. Sen. Carlson inserted an address by the general manager of the Farmers Cooperative Commission, Hutchison, Kans., reviewing achievements and problems of farm cooperatives. pp. 5319-21
6. WATER CONSERVATION. Sen. Ellender inserted his address to the Water Development Foundation of Oklahoma, Inc., reviewing achievements in the conservation of water resources. pp. 5395-8
7. SOIL CONSERVATION. Sen. McGovern inserted and commended an address by the Director of the Bureau of Land Management reviewing cooperative efforts of BLM in working with soil conservation districts in conservation activities. pp. 5345-7
Both Houses received a Maine Legislature resolution urging the Congress "to give the necessary and adequate support to the continuance of the agricultural conservation program and the Soil Conservation Service." pp. 5307, 5464
8. POTATOES. Both Houses received a Maine Legislature resolution urging enactment of legislation to abolish futures trading in Irish potatoes. pp. 5307, 5464
9. CIVIL DEFENSE. Sen. Young, O., expressed opposition to the expenditure of Federal funds for construction of civil defense fallout shelters. pp. 5332-3
10. FOREIGN AID. Sen. McGovern urged enactment of legislation to provide for greater participation of colleges and universities in providing technical assistance work in less developed countries. pp. 5347-8
11. FORESTRY; PERSONNEL. Received from this Department a proposed bill to validate certain over-payments made by the Forest Service to Southwestern Indian fire-fighter crews from N. Mex. and Ariz.; to Agriculture and Forestry Committee. p. 5306
12. REPEAL OF CERTAIN ACTS. Both Houses received from this Department a proposed bill to repeal the Standard Containers Acts, Tobacco Plant and Seed Exportation Act, Naval Stores Act, and Wool Standards Act; to H. Agriculture and S. Agriculture and Forestry Committees. pp. 5306, 5462

WATER RESOURCES RESEARCH ACT

MARCH 22, 1965.—Ordered to be printed

Mr. ANDERSON, from the Committee on Interior and Insular Affairs,
submitted the following

REPORT

[To accompany S. 22]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S.22) to promote a more adequate national program of water research, having considered same, report favorably thereon with an amendment and recommend that the measure as amended do pass.

Committee action in ordering S. 22 reported favorably, after comprehensive hearings, was unanimous.

PURPOSE OF MEASURE

S. 22, which was sponsored by Senator Anderson for himself and 20 other Senators of both political parties, would accomplish the purpose stated in its title by amending title II of Public Law 88-379, the Water Resources Research Act of 1964, to authorize grant, matching, and contract funds for assistance to educational institutions in addition to State land grant colleges, to competent private organizations and individuals, and to local, State, and Federal agencies in undertaking special research in water resource problems. Thus, S. 22 would restore to the Water Resources Research Act the provisions of title II of S. 2 of the 88th Congress which were adopted by the Senate on April 23, 1963. Title II of S. 2 was stricken in the House, and in conference only a modified, limited part of the program was restored.

In addition, the committee of conference added a provision requiring that all projects must be submitted to and lie before the Senate and House Interior Committees for 60 days prior to any appropriation of funds. In signing S. 2 into law (Public Law 88-379) on July 17, 1964, President Johnson expressed serious concern over this provision as violating "the spirit of the doctrine of separation of power between the executive and the legislative branches," and stated that the

procedure would result in delays and be detrimental to scientific research and timely achievement.

S. 22 also would delete the referral provision. The full text of the President's statement is set forth in the appendix to this report.

THE COMMITTEE AMENDMENT

On page 2, line 1, the committee struck out the words "private firms and individuals" and in lieu thereof inserted the following:

those private firms and individuals whose training, experience, and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects;

The reason for this amendment is patent: The committee desires to make clear the legislative intent that no Federal funds go to private organizations or individuals except those whose competence and qualifications to conduct a particular water research project are clearly established.

That is, the committee wants to free the Secretary of the Interior from any pressures to commit Federal funds made available under the bill to any person or organization except on the basis of demonstrated expertise in the field of water resource research.

DUPLICATION TO BE AVOIDED

During the course of the hearings on S. 22, the dangers of duplication of effort, inherent in a nationwide research program involving perhaps hundreds of institutions and individuals, were explored in depth and in detail. The committee records its concern over the possibility of duplicative efforts in the field of water resources research.

Considerable research has been accomplished through the years by various educational institutions and other research organizations in the Western semiarid States, whereas many educational institutions and other research organizations located in the more humid Eastern States will be entering this field of inquiry for the first time. Consequently, there exists a danger of duplication in the East of research already accomplished.

In keeping with the purposes of the Water Resources Research Act, the committee believes that if we are to meet the challenge that the demands for water in the near future will require, we must exert utmost care not to waste talent, facilities and finances in duplicative efforts. Therefore, the committee urges that the Secretary of the Interior take immediate and appropriate steps to insure that effective control measures (including sufficient qualified personnel) are established and continued to eliminate duplicative research efforts.

In this connection, the committee notes the unequivocal commitments made by the Director of the Office of Water Resources Research that a catalog of all such projects that are being financed in part or in whole by the Federal Government was in the process of preparation and that it would be kept up to date.

On the other hand, the committee concurs in the observation made during the hearings by Dr. William E. Morgan, president, Colorado State University, and chairman, Water Resources Committee, American Association of State Universities & Land Grant Colleges,

that while duplication in basic research was to be avoided, the *application* of the results of basic research, as distinct from the basic research itself, rarely could be described as duplication when made in different areas and under different conditions.

BACKGROUND OF LEGISLATION

Hearings on S. 22 and those on its parent bill, S. 2 of the 88th Congress, reenphasized the need for widespread research on a wide variety of problems connected with the supply, conservation, and use of water, ever-increasing quantities of which are required by our burgeoning population to meet new industrial, domestic, and recreational demands, as well as for the age-old production of food and fibers. A series of investigations and reports by the Congress, the executive branch, and State and private agencies document the foregoing statement of fact.

The urgency of the water-supply problem was summarized by President Johnson on the occasion of signing S. 2. The President said:

Abundant, good water is essential to continued economic growth and progress. The Congress has found that we have entered a period in which acute water shortages are hampering our industries, our agriculture, our recreation, and our individual health and happiness.

Assuming a continuation of current practices, by the year 2000 there will not be enough usable water to meet the water requirements of parts of the States of Arizona, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Wisconsin, and Wyoming.

Thus the problem is truly a national one, with States in the East, South, and Midwest as well as those of the West threatened with insufficient water supplies for their people and economy.

The findings of Congress to which the Chief Executive referred are, *inter alia*, those of the Senate Select Committee on Water Resources, of which the late Senator Robert S. Kerr, of Oklahoma, was chairman, and the Interior Committee hearings and reports on S. 2 and S. 1111, 88th Congress.

The Council for Science and Technology, after explaining that by A.D. 2000 we will require water equal to 75 percent of total runoff in the Nation, compared to today's 25 percent adds:

To obtain, as an assured supply, such a large fraction of the total runoff would require structures for storage, regulation, transportation, and distribution that would be far more expensive, in proportion to present structures for this purpose, than the proportionate increase in the amount of withdrawal. If surface storage were used, the required storage sites would intrude on areas already intensively occupied or needed for urban and industrial development. The total capital cost would be several hundred billion dollars, and annual charges would be of the order of tens of billions. Technological and economic developments leading to marked reductions in fu-

ture requirements for water withdrawal, to lowering of the unit cost of water structures, and to greater utilization of underground storage are clearly desirable. Otherwise, both the economic and social costs of meeting future water needs will be painfully high.

Research offers increasing opportunities to effect the needed savings, the Council for Science and Technology report finds. It states:

Research in recent years has led to spectacular savings in construction and operating costs and to provision of structures and facilities that function more efficiently and have a longer effective life. But opportunities and needs for further research-induced economies and other benefits are now greater than ever. Expanding scientific knowledge, improved instruments for measuring and transmitting data, electronic computers for collating and analyzing the data, and other technological advances have enhanced opportunities for even greater research gains than have previously existed and, thereby, for comparatively revolutionary advances in the tools and techniques of water resources development.

RESEARCH NEEDS

Clearly, research all the way around the hydrological cycle is needed, including both basic and applied, or practical, research undertakings.

Water, as an element, is worldwide. Much research, both basic and applied, will have broad and worldwide value.

But water problems vary with the environment in which the element occurs—the difference in soils, climate, industry, population, vegetation, geology, topography, and even legal, social, and economic arrangements, to mention only a few.

The adequacy of usable water supplies in the critical water basin of the country depends, not on a single solution applicable to all areas, but on solutions that will vary with each of them. In most of the western areas consumptive uses and inadequacy of total water supply will be the major cause of shortage. In the central and eastern areas, the quality of water as well as its quantity and requirements for streamflow for downstream navigation will be matters of vital concern.

The Senate Select Committee on Water Resources, in its report in January 1961, indicated some of the fields of research in which work needs to be accelerated, by the following language in its report:

* * * the committee believes that substantial research efforts are justified, looking toward exploration of all possibilities for increasing usable water supplies or making more efficient use of present supplies, by such means as—

(a) reducing evaporation from the surface of reservoirs;

(b) elimination of water-loving vegetation (phreatophytes) along the edges of watercourses and reservoirs;

(c) changing or modifying a forest and vegetative cover on watersheds to reduce evapotranspiration;

(d) reducing seepage losses in irrigation canals and other water distribution systems and other wasteful practices;

(e) reduction of dilution requirements for pollution abatement by development of improved methods for treatment or control of waste materials that are disposed of in water;

(f) waste water salvage;

(g) reuse, recycling, and elimination of wasteful water use by industry;

(h) desalting of saline or brackish water;

(i) weather modification;

(j) more accurate quantitative forecasting of meteorologic events;

(k) application of nuclear products in research; and

(l) improved use and control of ground water.

Additionally, the select committee suggested that, in the field of economics and social sciences, research should be undertaken on:

(a) Economic incentives to assure conservation and better use of available supplies.

(b) Alternative uses of water.

(c) System planning.

(d) Economic effects of existing projects.

Our present Federal expenditures for water resources research are approximately one-half of 1 percent of annual investment in facilities, far below comparable rates in other public and private investment fields.

START MADE UNDER WATER RESOURCES RESEARCH ACT

With the enactment of Public Law 88-376, S. 2, 88th Congress, a broad start toward meeting these present and future needs has been made. This forward-looking, basic legislation, described by President Johnson as filling "a vital need," provides Federal financial assistance for the participating States to establish and carry on the work of a competent and qualified water resources research institute, center, or equivalent agency in their State land-grant colleges. Under the limited appropriations made available in the supplemental appropriation for fiscal 1965, some 43 States had submitted by the December 5 deadline established by the Secretary of the Interior the detailed applications required by the law for funds of water research projects in their land-grant institutions. Fourteen centers were selected out of the 43 applicants.

At the hearings on S. 22 on March 3, Dr. Roland Renne, former president of Montana State University at Bozeman and presently the Director of the newly established Office of Water Resources Research in the Department of the Interior, submitted a table to the committee summarizing by nine major categories the types of projects that have been submitted for consideration. This summary is as follows:

CATEGORIES OF WATER RESOURCES RESEARCH

1. Nature of water.
2. Water cycle—including precipitation; snow, ice, and permafrost; evaporation and transpiration; streams and lakes; ground water and hydrogeology; oceanic influences; and forecasting.
3. Water and land management—including water movement in soils; water and plants; watershed protection; water-yield improvement; erosion and sedimentation; upstream flood abatement; irrigation; and drainage.
4. Development and control—including water supply; flood control (downstream); hydropower; navigation; urban and industrial water-use problems; recreation; fish and wildlife; estuarine oceanography; coastal engineering.
5. Qualitative aspects—including characterization of wastes; effects of pollution on water uses; interactions of wastes; disposal of waste effluents; surface interactions; effects of development on quality; quality characteristics; and aqueous solutions.
6. Reuse and separation—including saline-water conversion; advanced waste treatment; improved treatment of wastes; treatment of water; and use of water of impaired quality.
7. Economic and institutional aspects—including role of water in growth, economics of development and management; economic analysis of institutions; area appraisals.
8. Engineering systems—including design; materials; and construction, operation, and maintenance.
9. Manpower and research facilities—including education and training; and research facilities.

Preliminary breakdown of research projects proposed by 14 State water resources research centers

Location of center by State	Number of projects proposed by research categories:									Total projects
	I	II	III	IV	V	VI	VII	VIII	IX	
Arkansas.....			1	2						3
Colorado.....		2		2	1					5
Georgia.....	3	6	2	1	4	1	1	2		20
Idaho.....			1				1			2
Illinois.....		1			3			2		6
Michigan.....		2	2	3	1			1		9
Missouri.....		1	1					1		3
Montana.....		1		1						2
New Hampshire.....		1	1		1					3
New Mexico.....			4	2	1					7
New York.....				2		1			1	4
Ohio.....				1	3					4
Utah.....		1			1		1	1	1	5
Washington.....		2	2	2	1		1		1	9
Total.....	3	17	14	16	16	2	4	7	3	82
Percentage.....	3.7	20.7	17.1	19.5	19.5	2.4	4.9	8.5	3.7	100

NOTE.—Broad subject matter headings are those developed and used by the Committee on Water Resources Research of the Federal Council for Science and Technology, Office of Science and Technology.

Preliminary breakdown of research projects proposed by State water resources research centers which did not receive an initial Federal allotment

Location of center by State	Number of projects proposed by research categories:									Total projects
	I	II	III	IV	V	VI	VII	VIII	IX	
Alabama.....					4	1		1		6
Alaska ¹										
Arizona ¹										
California ¹										
Connecticut.....		3	2	1	3		1	2		12
Delaware.....		1	2	3	2	1	2			11
Florida ¹										
Hawaii.....		3	3	1				1	1	9
Indiana.....		1	2	1	2					6
Iowa ¹										
Kansas.....		2	2		2					6
Kentucky.....		1	1	1	1		1	1		6
Louisiana.....		1	2	3	3		6	2		16
Maine.....			1	1	4					6
Maryland ¹										
Massachusetts ¹										
Minnesota.....		4	5		2			2		13
Mississippi.....			2				2			4
Nebraska.....		2	7				4	1		14
Nevada ¹										
New Jersey.....		1		1	1		1	1		5
North Carolina ²		2	8	10	11	1	3	2		37
North Dakota ²	1	1	16	5	8	1	3	4	2	41
Oklahoma.....	1		2	2	4				1	10
Oregon ¹										
Pennsylvania.....		1	1		5		1			8
Puerto Rico ¹										
Rhode Island.....					3		1		1	5
South Carolina.....		4			2		1	1		8
South Dakota ¹										
Tennessee.....			2		2			2	1	7
Texas.....		1	1		3		1			6
Vermont.....		1	1		3					5
Virginia.....		2		2	3			1		8
West Virginia.....		1	1		5			1		8
Wisconsin.....					1		1			2
Wyoming.....									1	1
Total.....	2	31	61	31	74	4	28	22	7	260
Percentage.....	1	12	23	12	28	2	11	8	3	100

¹ List of specific projects to be supported by Federal allotment not available.

² Projects to be initiated first are not specified.

NOTE.—Board subject matter headings are those developed and used by the Committee on Water Resources Research of the Federal Council for Science and Technology, Office of Science and Technology.

Because of the President's opposition to the "back-door veto" provision of title II of Public Law 88-376, action was taken for putting its limited provisions into effect.

As of the time of the committee's hearing on S. 22, water resources research institutes had been established in all 50 States and Puerto Rico.

Dr. Renne pointed out that many of the States where the land grant university is separate from the State university they have through a memorandum of understanding or agreement, or through a setting up of a joint council or executive committee for the center, worked together in the preparation of the program.

For example, in the State of Washington, the Washington State University at Pullman, where the center is located, and the University of Washington at Seattle drew up a memorandum of understanding, it was approved by the board of regents, and the research program includes both the University of Washington and Washington

State, and they were one of the 14 of the original allotments and they are underway.

BROAD-SCALE PARTICIPATION ESSENTIAL

Impressive as is the start that already has been made under Public Law 88-379, the committee is convinced that the program, which must be nationwide in scope, should not be confined only to institutes which are a part of the land-grant educational institution system, excellent as the organizations are. At the committee hearings, eminent scientists and educators, many of them from land-grant colleges, gave detailed and documented testimony as to the desirability of broadening and strengthening the program by enactment of S. 22.

The National Association of State Universities & Land Grant Colleges, composed of 97 State and land-grant universities and colleges located in each of the States and in Puerto Rico, submitted testimony through the chairman of its water resources committee, William E. Morgan, president of Colorado State University, strongly urging enactment of S. 22. President Morgan pointed out that the bill "permitted what the military theorists would call concentration of force at the same time it promoted the development of a balanced research effort under the conditions that exist in our country, a condition of wide diversity and broad dispersion of our national research talent." He said:

The term "center of excellence" has been used, and doubtless abused, in freewheeling discussion of the broad subject of water resources research, but it serves my purpose well at this point, since title II funding would encourage the development of such centers. In its broadest context, the water problem in North America deserves the attention of research talent wherever it exists, and the mechanism of title II enables the research administrator to seek it out and induce it to work.

Passage of S. 22 would facilitate and promote this end. On behalf of our association, I urge you to give favorable consideration to the bill.

Similar support for the bill was expressed by Sam Thompson on behalf of the Interstate Conference on Water Problems of the Council of State Governments; Dr. John Frey, director of the Institute for Research on Land and Water Resources at Pennsylvania State University and also a representative of the National Association of State Universities & Land Grant Colleges; Dr. Donald M. MacArthur, manager, Chemistry and Life Sciences Research Center, Melpar, Inc.; Dr. Omer J. Kelley, manager, Agricultural Research Center, Stanford Research Center; Dr. John I. Bregman, manager, Water Research Center, Illinois Institute of Technology; James K. Rice, president, Cyrus W. Rice Co., Pittsburgh; Dr. Allan F. Agnew, director, Water Resources Research Center, Indiana University; Dr. M. G. Wolman, Universities Council on Water Resources, Johns Hopkins University; Milton Fricke, Papillion, Nebr., chairman, Water Resources Committee, National Association of Soil & Water Conservation Districts; and Philip M. Glick, general counsel of the association.

COMMITTEE RECOMMENDATION

Your committee is convinced that the water resources problem in our country is a national problem, and can best be solved by bringing all of our scientific knowledge and technical expertize to bear upon its solution. Such an approach necessarily involves utilization of "centers of excellence" in addition to the State land-grant colleges now eligible for aid under Public Law 88-379. Therefore, speedy enactment of S. 22, as amended, is recommended with the bipartisan support of all of the members of the committee, the administration, and the States and private organizations and individuals with knowledge in the field.

EXECUTIVE AGENCY REPORTS

The executive agencies' reports in support of the enactment of S. 22 are set forth below:

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., March 1, 1965.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR JACKSON: This responds to your request for the views of the Department of the Interior on S. 22, a bill to promote a more adequate national program of water research.

We recommend that the bill be enacted.

S. 22 would amend title II of the Water Resources Research Act of 1964. Under title II of the Water Resources Research Act the Secretary of the Interior is authorized to support a program of research into aspects of water problems related to missions of the Department of the Interior. Appropriations of \$1 million per year for 10 fiscal years commencing with fiscal year 1965 are authorized for the program. Money appropriated pursuant to this authority may be used for grants, contracts, matching or other arrangements with educational institutions (except those at which a water resources research institute is maintained pursuant to title I of this act), private institutions, private firms, or individuals and Government agencies, local, State, and Federal. The act provides that appropriations may be made to finance grants, contracts, and other arrangements only if they are not disapproved by the Senate or House Committees on Interior and Insular Affairs.

S. 22 would not change the purpose of title II of the Water Resources Research Act, but it would enlarge the scope of the program and remove some limitations from it. The bill would make four important changes in title II.

First, appropriations would be authorized at the level of \$5 million for fiscal year 1966. The authorization would increase by \$1 million annually until the level of \$10 million was reached. The authorized ceiling would remain at \$10 million per year thereafter.

Second, the 10-year limit on the authorization for appropriations to carry out title II would be eliminated.

Third, the prohibition against support of research at educational institutions where there is a title I water resources research institute would be dropped.

Fourth, the provisions for legislative committee review of proposed grants, contracts, and other arrangements would be dropped.

We believe that all four of the changes that S. 22 would effect are justifiable and would benefit the program. We, therefore, support the bill.

As to the first change, in the short life of the Office of Water Resources Research (established in the Department to administer title II), we have received 36 proposals for research activity into water resource problems affecting the Department's missions. These proposals aggregate \$1,750,000 and come from responsible, qualified individuals and organizations. Many of them would be accepted if it were possible to do so within the limitations of the appropriations available. This outpouring of proposals is particularly striking in view of the fact that appropriations under title II have not yet been made. When the limit of authorized appropriations was established at \$1 million per year it could not be known with certainty what level of activity could be anticipated. In supporting the bill that became the Water Resources Research Act the Department was not in a position to predict what level of response would be stimulated by the act. Experience based on the number of proposals received to date demonstrates that \$1 million per year is inadequate, and suggests that an authorization of \$5 million to support the first year's research program is justified. As the program becomes better known, and as more talent and capacity is developed over the next few years, we expect promising proposals to increase, thus justifying a gradually rising appropriation ceiling to \$10 million per year by 1971.

As for establishing the authorization for appropriation without a finite time limit, at least two points should be made: (1) much of the research that will be undertaken will be of a long-range nature and the prospect of long-term support for it must exist if it is to commence; and (2) water problems will persist and the capacity to analyze and deal with them will grow in the future; this Department's mission will become more important and complex as time goes on and it is reasonable that the program be authorized on a continuing basis.

The third objective of S. 22—dropping the prohibition against associating with institutions maintaining water resource research institutes—makes eminent sense. These institutes, and the educational centers, where they are located, are likely to be the loci of much of the water resources research capability in the Nation. The Secretary should have the authority to look to that capability to accomplish the purposes of title II. The provision in the bill that support may not be given to research projects otherwise being studied will insure that duplication will not result from dropping this provision of the act.

Fourth, S. 22 would eliminate the authority of the Committees on Interior and Insular Affairs of the House of Representatives and Senate to bar appropriations to fund research projects proposed to be undertaken pursuant to title II of the act.

The last sentence of section 200, title II, requires that each proposed grant or other arrangement be submitted to the Congress to lie before the Committees on Interior and Insular Affairs of the House of Representatives and Senate for 60 days. Appropriations to finance these grants or other arrangements are permitted under the act only if neither committee disapproves them within the 60-day review period.

In approving the Water Resources Research Act the President made reference to this requirement, stating:

"One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program, is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation."

S. 22 would carry out the President's request.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., March 2, 1965.

HON. HENRY M. JACKSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in response to your request for the views of the Bureau of the Budget on S. 22 to promote a more adequate national program of water research.

S. 22 would repeal section 200 of the Water Resources Research Act of 1964 (Public Law 88-379), and substitute therefor a provision which would authorize appropriations to the Secretary of the Interior of \$5 million in 1966, increasing \$1 million each year thereafter for 5 years, and \$10 million annually thereafter for grants, contracts, matching, or other arrangements for research on water problems related to the mission of the Department of the Interior.

Repeal of section 200 of Public Law 88-379 would eliminate, among others, a provision therein requiring that projects proposed to be initiated under the section must lie before the Committees of Interior and Insular Affairs of the Senate and the House of Representatives for 60 days, and that only if neither committee disapproves them within the review period could funds be appropriated to finance the projects. The President requested deletion of this provision when he approved the Water Resources Research Act on July 17, 1964. We would, therefore, strongly favor action which would remove this undesirable requirement.

S. 22 would change the existing provisions of section 200 by (1) raising the ceiling on and removing the 10-year duration limitation on appropriation authorizations, and (2) removing the prohibition

against use of funds under title II by institutes established under title I of the act.

We believe it may be desirable to enable the Secretary of the Interior to make funds under title II available to the institutes established under title I of the act, and would not object to removal of the prohibition. In supporting water research related to the mission of the Department of the Interior, the Secretary should have the freedom to seek the most competent capability. Greatest qualification on a given subject may, in fact, reside with an institute.

As to the enlargement of appropriation authorizations for title II research, the complexity and number of water problems related to the mission of the Department of the Interior appear to be great enough to indicate clearly that \$1 million annually is insufficient to support good research leading to their solution. The bill, S. 2 as the administration supported it in the 88th Congress, provided for the same amounts as contained in S. 22.

Sincerely yours,

PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

CHANGES IN EXISTING LAW

In compliance with subsection (4) of rule XXIX of the Standing Rules of the Senate, changes in existing law made by the bill, S. 22, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

PUBLIC LAW 88-379 (78 STAT. 331) ACT OF JULY 17, 1964

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and

territories which may provide colleges for the benefit of agriculture and the mechanic arts," or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the

basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any por-

tion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. [There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions; with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.] *There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1966, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; those private firms and individuals whose training, experience and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.*

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this section shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 306. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

Approved July 17, 1964.

APPENDIX

The text of President Johnson's statement upon signing S. 2, 88th Congress, into law (Public Law 88-379) is set forth and made a part of this report:

STATEMENT BY PRESIDENT JOHNSON

The Water Resources Research Act of 1964, which I have approved today, fills a vital need.

Abundant, good water is essential to continued economic growth and progress. The Congress has found that we have entered a period in which acute water shortages are hampering our industries, our agriculture, our recreation, and our individual health and happiness.

Assuming a continuation of current practices, by the year 2000 there will not be enough usable water to meet the water requirements of parts of the States of Arizona, California, Colorado, Delaware, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Dakota, Texas, Utah, Wisconsin, and Wyoming.

This legislation will help us solve this problem. It will create local centers of water research. It will enlist the intellectual power of universities and research institutes in a nationwide effort to conserve and utilize our water resources for the common benefit. The new centers will be concerned with municipal and regional, as well as with national, water problems. Their ready accessibility to State and local officials will permit each problem to be attacked on an individual basis, the only way in which the complex characteristics of each water deficiency can be resolved. The bill contemplates a high degree of interstate cooperation, and I urge that this be encouraged.

In large measure, this legislation is a tribute to the vision and wisdom of Senator Clinton P. Anderson, of New Mexico. He has long recognized the problems. He developed the program. He guided it through Congress. He has been in the forefront of the effort to see that adequate supplies of water are available in all parts of the Nation.

One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program, is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappro-

priate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation.



89TH CONGRESS
1ST SESSION

S. 22

[Report No. 127]

IN THE SENATE OF THE UNITED STATES

JANUARY 6, 1965

Mr. ANDERSON (for himself, Mr. ALLOTT, Mr. BARTLETT, Mr. BAYH, Mr. BIBLE, Mr. BURDICK, Mr. CARLSON, Mr. FANNIN, Mr. GRUENING, Mr. HART, Mr. JACKSON, Mr. JORDAN of Idaho, Mr. KUCHEL, Mr. LONG of Missouri, Mr. MANSFIELD, Mr. MCGEE, Mr. MCGOVERN, Mr. METCALF, Mr. MORSE, Mr. MOSS, Mr. TOWER, and Mr. YARBOROUGH) introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

MARCH 22, 1965

Reported by Mr. ANDERSON, with an amendment

[Omit the part struck through and insert the part printed in italic]

A BILL

To promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 That (a) section 200 of Public Law 88-379 of the Eighty-
4 eighth Congress is repealed and

5 (b) That there is enacted in lieu thereof the following:

6 “SEC. 200. There is authorized to be appropriated to the
7 Secretary of the Interior \$5,000,000 in fiscal year 1966,
8 increasing \$1,000,000 annually for five years, and continuing
9 at \$10,000,000 annually thereafter from which he may make

1 grants, contracts, matching, or other arrangements with edu-
2 cational institutions, private foundations, or other institutions;
3 with ~~private firms and individuals~~ *those private firms and*
4 *individuals whose training, experience and qualifications are,*
5 *in the judgment of the Secretary of the Interior, adequate*
6 *for the conduct of water research projects;* and with local,
7 State, or Federal Government agencies, to undertake re-
8 search into any aspects of water problems related to the
9 mission of the Department of the Interior, which may be
10 deemed desirable and are not otherwise being studied.”

22.6

2.55

2.55

89TH CONGRESS
1ST SESSION

S. 22

[Report No. 127]

A BILL

To promote a more adequate national program
of water research.

By Mr. ANDERSON, Mr. ALLOT, Mr. BARTLETT,
Mr. BAYH, Mr. BIBLE, Mr. BURDICK, Mr.
CARLSON, Mr. FANNIN, Mr. GRUENING, Mr.
HART, Mr. JACKSON, Mr. JORDAN of Idaho,
Mr. KUCHEL, Mr. LONG of Missouri, Mr.
MANSFIELD, Mr. MCGEE, Mr. MCGOVERN,
Mr. METCALF, Mr. MORSE, Mr. MOSS, Mr.
TOWER, and Mr. YARBOROUGH

JANUARY 6, 1965

Read twice and referred to the Committee on Interior
and Insular Affairs

MARCH 22, 1965

Reported with an amendment

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C. 20250

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U. S. Department of Agriculture

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

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For actions of March 25, 1965

89th-1st; No. 54

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HIGHLIGHTS: Both Houses received President's message on area and regional development. Senate passed bill to expand water research program. Sen. Hartke urged greater cooperation between agriculture urban interests. Sen. Hruska criticized proposal to transfer meat inspection costs to meat industry. House committee reported Interior appropriation bill (includes Forest Service). Rep. Hansen inserted survey on farm policy. House committee voted to report bill to extend date for final report to Commission on Food Marketing. House Rules Committee cleared water resources planning bill. Sen. Fong introduced and discussed bill to provide punishment for assault or killing USDA employees.

SENATE

1. REGIONAL DEVELOPMENT. Both Houses received the President's message recommending a program of area and regional economic development in distressed areas (H. Doc. 126)(pp. 5762-5, 5843-6) in which he: Recommended creation of the position of Economic Development Administrator in the Department of Commerce to administer the program, and stated that the functions of ARA would be transferred to this successor organization. Recommended a direct grant program for development facilities related to economic development and matched at 50 percent of the cost of the project. Stated that the proposed new organization would have four main components: redevelopment areas, economic development districts, action planning commissions for regions, and economic development centers. Stated that he has directed the Secretary of Commerce to work closely with interested departments and agencies in achieving a coordinated Federal effort.
2. WATER RESEARCH. Passed as reported S. 22, to authorize grant, matching, and contract funds to the Secretary of the Interior for assistance to educational institutions, in addition to State land grant colleges, to competent private organizations and individuals, and to local, State, and Federal agencies in undertaking special research in water resource problems. pp. 5680-1
3. WATER AND AIR POLLUTION. Passed as reported S. 560, to provide that Federal agencies having jurisdiction over any building, installation, or other property shall discharge wastes from such installations only in compliance with standards which are prescribed by HEW; authorize appropriations to Federal agencies for the installation, maintenance, and operation of air and water pollution waste disposal systems; require Federal agencies to report to HEW on waste disposal practices; and provide that Federal agencies, on or after October 1, 1966, shall not purchase any automotive vehicle unless it is equipped to prevent or reduce the discharge of pollutants from its exhaust in accordance with HEW standards. pp. 568-1
4. FORESTRY; PROPERTY. Received from this Department a proposed bill to remove the \$3,000 per annum limitation on the authority of the Secretary of Agriculture to hire or rent property from Forest Service employees, when in the public interest; to Agriculture and Forestry Committee. p. 5627
5. STOCKPILING. Received from GSA a proposed bill to authorize the disposal, without regard to the prescribed 6-months waiting period, for approximately 47 million pounds of abaca from the national stockpile; to Armed Services Committee. p. 5628
6. INTERSTATE COMMERCE. Received from the Interstate Commerce Commission the following proposed legislation which was referred to the Interstate Commerce Committee: A bill to insure the adequacy of the national railroad freight car supply; a bill to require the establishment of through routes and joint rates between motor common carriers of property, and between such carriers and common carriers by rail, express, and water; a bill respecting motor carrier safety regulations applicable to private carriers of property; and a bill to establish a uniform system of time standards and measurement for the U. S. and to require the observance of such standards. p. 5628
7. HOUSING. Received from the Budget Bureau proposed legislation to establish a Department of Housing and Urban Development; to Government Operations Committee p. 5628

The two Governments are expected to move rapidly to establish formal ties. This will involve the question of where the West German Embassy will be. The Israelis want it in Jerusalem, but as a ranking official put it, "we are not going to fight about it."

All the major powers have established embassies in Tel Aviv to avoid conflict with a 1947 United Nations resolution that placed Jerusalem under international trusteeship. The situation became anachronistic after the Israel Government moved its offices to Jerusalem, which it maintains is Israel's capital, in 1950.

A number of countries, especially from Africa and Latin America, have embassies in Jerusalem. Bonn may do the same because it is technically not bound by the 1947 resolution as it is not a member of the U.N.

[From New York Herald Tribune,
Mar. 17, 1965]

NASSER SPREAD THIN

President Gamal Abdel Nasser has been a busy man in these past few months. He has fomented war in the Congo, waged a humiliatingly inconclusive one in Yemen, and conducted a diplomatic game with West Germany which will probably have far-reaching effects. But how well the United Arab Republic has fared in all of this frenzied personal statecraft is another matter.

The steps by which Nasser arrived at an open break with Bonn show a perverse kind of cunning. First, Nasser pressured West Germany into ending its arms shipments to Israel—which might count as a gain for the Arab world. Then he flaunted a visit by Walter Ulbricht, of Communist East Germany, before all the nations. Except as a form of international impudence, this does not promise much for the United Arab Republic. And, when Bonn, in retaliation, sought diplomatic relations with Israel, Nasser declared that he would break both diplomatic and economic ties with the Federal Republic.

This would seem to be a plain case of cutting off the United Arab Republic's nose to spite its face, but Nasser tried to get the other Arab States to go along with him. Those of North Africa have very close ties with Western Europe; they apparently opposed any severe action against West Germany. The others seem to have agreed to recall their Ambassadors from Bonn, but not to recognize the Communist puppet Germany or break economically with West Germany.

In all, it is not clear what Nasser has done for his country, beyond driving West Germany and Israel closer together, just as France and Israel became partners after Nasser seized the Suez Canal. It is a curious series of episodes in the history of diplomacy and it suggests that Nasser is better at devising means of annoying other nations than of helping his own.

[From the New York Times, Mar. 15, 1965]

ISRAEL AND BONN

The Israel decision to accept West Germany's bid for formal diplomatic relations is a constructive move that benefits both sides. It also helps clear the international atmosphere. Earlier reports of Israeli conditions for normalizing relations raised possibilities that could have adversely affected the position of Chancellor Erhard's government, while providing ammunition for Israel's enemies.

As Israel Foreign Minister Golda Meir remarked last week, the West German suggestion that diplomatic relations be established produced a debate "between the head and the heart" for every Israeli. With memories of Hitler's mass murder of Jews still strong, it is understandable that there should be a carryover of emotional repugnance to the idea even two decades after nazism's

overthrow. The decision to accept Bonn's offer, therefore, represents a victory for reason over emotion. Israel's international position and its economic prospects both stand to gain materially from closer ties with West Germany, and these considerations properly proved decisive.

The confusion already reigning in Arab ranks testifies to Chancellor Erhard's wisdom in deciding to counter Egypt's welcome to Walter Ulbricht by the positive move of recognizing Israel rather than the negative one of breaking relations with Cairo. President Nasser was not serving any Arab interest when he received the East German leader, and the result of his action has already brought open criticism of him from Tunisian President Bourguiba.

Nasser's recent threats against Bonn represent a form of attempted blackmail that can only increase West German resentment. Many Arab leaders whose prestige is less personally involved than that of the Egyptian strong man can easily calculate that their countries would suffer substantially from a break in relations with Bonn. They are hardly likely to want to bear the costs of his folly.

President Nasser did not plan it that way, but at this moment Israel and West Germany appear to be the prime beneficiaries of his blundering venture into international gamesmanship.

[From the New York Herald Tribune, Mar.
15, 1965]

ISRAEL ACCEPTS TIES WITH BONN: ISRAEL ACCEPTS TIES WITH WEST GERMANY

(By Richard Chesnoff)

JERUSALEM.—Israel's Government decided yesterday to accept West Germany's offer to establish full diplomatic relations immediately.

With two abstentions, Premier Levi Eshkol's coalition cabinet voted unanimously for the ties. The *Ahdut Haavoda* Socialist ministers refrained from voting pending their party's official decision today.

Despite international reports to the contrary, informed Jerusalem sources said yesterday that Israel and West Germany had reached "basic agreement" on the major issues outstanding between them.

These sources reiterated last week's report from Israel that West Germany had agreed to fulfill—perhaps through a "third party"—an arms-shipment deal cut off last month under pressure from President Nasser of Egypt.

Foreign Ministry sources said the formal exchange of ambassadors between Israel and West Germany would now "move swiftly."

Mr. Eshkol will present the government verdict to the Knesset (Parliament) tomorrow. Political observers said that although some fervent opposition to the move is expected, Mr. Eshkol is assured of a minimum of 65 percent Knesset backing.

The Cabinet Secretary said Mr. Eshkol told the Cabinet: "There is a basis for hope to find agreed settlement on outstanding questions."

Other sources, said Mr. Eshkol, was "quite satisfied" with the results of his secret talks last week with West German Chancellor Erhard's special envoy, Kurt Birrenbach. The emissary is expected to return from Bonn Wednesday to continue the negotiations.

When he goes later this month for talks with British Prime Minister Wilson, Mr. Eshkol may stop for talks with Chancellor Erhard.

The \$80 million, American-backed arms deal with Israel was halted by Bonn after threats by President Nasser to recognize the East German Communist regime if the shipments continued. The cutoff strained Bonn's informal relations with Israel but did not succeed in halting Cairo's friendly moves toward East Germany.

The Jerusalem sources said that Bonn, not wishing to antagonize the Arab States more than it has by recognizing Israel, might fulfill the unfinished portion of the arms deal—about \$16 million worth—through a "third party."

Israel has steadfastly turned down Chancellor Erhard's offer of economic compensation for the arms halt.

As to the future, Bonn reportedly has offered Israel an extensive, no-strings-attached economic grant but has not acceded to an Israel request for direct Bonn military aid beyond the original deal.

CAIRO.—Israel's decision to accept a West German proposal to establish diplomatic relations threw the Cairo conference of 13 Arab Foreign Ministers into turmoil yesterday, conference sources reported.

The ministers called their second recess of the day, still without a decision on any retaliatory steps taken against Bonn, after receiving a report of the Israeli Cabinet decision.

Conference sources said the report provoked a "heated discussion," with at least four Foreign Ministers urging their colleagues not to vote for reprisals beyond the power of the Arab world to implement.

President Nasser has urged the Arab States to break diplomatic and economic relations with Bonn and recognize Communist East Germany if Bonn establishes relations with Israel. Saturday night he said Egypt would take these measures regardless of what the other Arab States did.

[From the Chicago (Ill.) Sentinel, Mar. 11,
1965]

BONN MAKES CONCILIATORY MOVES TOWARD ISRAEL—ERHARD SAYS HE WILL STOP ALL AID AND CREDITS TO NASSER

BONN (JTA).—Chancellor Ludwig Erhard, in an official statement issued to the press, announced Sunday that the West German Government is ready to establish diplomatic relations with Israel and to compensate Israel for the rest of the promised arms aid which was cut off after a protest from Egypt. The statement also said that the Bonn government will stop all economic aid and further credits to Egypt.

The statement emphasized that the West German Government rejects any kind of intervention in her affairs, and particularly in her relationship with Israel. At the same time it pointed out that the granting of diplomatic recognition to Israel is not directed against any of the Arab States. The Chancellor's statement stressed that President Nasser has jeopardized the traditional German-Arab friendship and that the state visit by Premier Ulbricht of Communist East Germany to Egypt, at Nasser's invitation, is bound to influence this friendship.

The Chancellor's statement was read at an extraordinary press conference by State Secretary Karl-Gunther von Hase who declared that the Chancellor, empowered by the Federal Republic's constitution, has spelled out his government's foreign policy, as well as his own position. The statement made it clear that the policy has been formulated after consultation with Germany's principal allies—the United States, France and Britain. It noted that all of Germany's political parties represented in the Bonn Parliament have been informed of the policy statement.

(Official circles in Jerusalem told the Jewish Telegraphic Agency Sunday that the statement by Chancellor Erhard is a "surprise," in view of the Bonn government's position of the last week. Observers in Jerusalem wondered Sunday whether Dr. Erhard's mention of fulfilling his government's arms aid agreement with Israel meant that he was now ready to carry out the Israel-German pact and will resume Germany's arms deliveries upon which Israel insists.)

The statement concluded as follows "After very careful consideration of the problems as a whole, and through weighing all possible developments, even those outside of the immediate interests of Germany in the Middle East, the Chancellor has decided:

"1. The invitation of Ulbricht by Egypt has been countered by the Federal Republic by the stopping of economic aid. This means the Federal Republic will not participate in Egypt's second 5-year plan. The Federal Government will not grant to Egypt any further capital aid, and refuses to grant Egypt any delays in the payment of Government-guaranteed debts due for long-period credits. Running obligations will be reconsidered, of course, in accordance with international law.

"2. That part of the German people living in the Soviet Zone has been deprived of the self-evident right to self-determination. The justification of this rule by force will be considered by the Federal Government of Germany an unfriendly act and countered in each case by appropriate measures.

"3. The Federal Republic of Germany wishes to establish diplomatic relations with Israel. This step is bound to normalize conditions. It is not directed against any Arab country.

"4. By its decision not to supply arms to areas of tension, and by deciding to compensate for the rest of deliveries pending, in agreement with Israel, the Federal Government has contributed considerably to the evolution of a clear Middle East policy. The Federal Government thinks it necessary to declare in this context that it rejects endeavors to influence its policy in this area particularly as regards its relations with Israel, be it the 'conflict partner' who tries to do so or whoever he may be.

"5. Together with its allies, who have repeatedly asked Germany to be responsible for peace and quiet in the Middle East, the Federal Republic will endeavor through its presence to diminish tensions."

GERMANS AND JEWS: EACH MUST LEARN TO FACE THE OTHER WITHOUT PREJUDICE

(NOTE.—This is one of the typical articles that appeared in the German press.)

LÜBECK, February 28.—It often seems as though we don't really want to overcome our past, but to overwhelm it. At the moment there are two matters in particular giving rise to this impression: Is the term of limitation for murder with respect to unpunished Nazi crimes to be extended or not? And: Is the Federal Republic bound to support Israel with weapons in its struggle for existence against the Arab states?

These are two questions that have divided the Germans to just about the same extent as they have prejudiced the rest of the world against the Federal Republic. In fact, full-page advertisements, discussing the betrayal of the nation toward which our guilt is greatest, have been published by Jewish organizations in the United States. These are serious allegations, and written in blind anger. The German Ambassador in Washington has deplored them, and quite rightly.

UNTRUSTWORTHY

Yet just as serious as making allegations like this is to take the stand of a well-known Swiss newspaper, a paper that tends to favor us. It expresses the opinion that there is a feeling of discomfort in the world, a discomfort called Germany. It would hardly be possible at the moment to express more clearly and kindly the fact that we have once more managed to get ourselves a name for being untrustworthy and unreliable. We are beginning to look like the wicked Germans again, the people who can't be trusted an inch.

How has our political and moral standing managed to decline to such an extent? In the first place, the Federal Government has

failed repeatedly and culpably to do the right thing. It hesitated when it was time to negotiate, or it finally reached a decision it more or less had to recall later. And the problems of the term of limitation and military aid to Israel have finally become classic examples of just this. In both cases, Dr. Erhard's cabinet was too quick to commit itself. It either did not want to see, or could not see, what the consequences of such rashness would be. In the matter involving the statute of limitations, the Federal Republic has already corrected its stand, but doubts about us still remain. Because we were the very ones to arouse them. And the same is true for the question of military aid to Israel. Intermediation is already being mentioned. And so it doesn't seem quite impossible that this particular Bonn decision may be corrected. On the one hand the Israelis are insisting that we fulfill our part of the secret treaty, and, on the other, Nasser has, according to the Hallstein Doctrine, become an enemy.

We have got ourselves caught in an embarrassing situation for which we ourselves are to blame. In the final analysis we shall only be able to get out of it by allowing more than we originally wanted to prevent. But the Federal Republic was not the only one to blame for the decline in our political and moral standing—a decline that is weakening our position considerably. The international pressure on Bonn, more conscious than unconscious, has contributed just as much to this as the wave of nationalism that is beginning to set in in the Federal Republic. These two factors are connected with one another, and each depends upon the other. The more strongly the pressure from outside makes itself felt, the more strongly is the counterpressure going to build up from within, and vice versa: a highly dangerous spiral in which we have got ourselves involved and to which the Federal Government has contributed. It wanted to break down nothing abroad and spoil nothing at home. It wanted to remain internationally reliable and nationally recognized. Yet, even in this, it has failed so far. It has perhaps never been so clear as it is at the moment that the relationship between the Germans and the Jews is a keystone of all our politics. The moral keystone particularly. This tends to be forgotten from time to time. The crimes against Jewish people during the Third Reich remain unparalleled. And the expiation for these crimes must, accordingly, be unparalleled, too. Recognizing these basic facts must overshadow any reference to our exemplary financial reparations, or the statement that we should at last be left in peace. Understandable though it is that many Germans want to close old accounts, wanting to do this sort of thing pays less politically than being able to do it. So we have to be satisfied with the fact that it just is not within our power to break with our past, and never will be. Not from our side, at least.

The Federal Republic and the nation itself have usually ignored this, because they are beginning to regard their past more and more as a curse. By saying he was willing, if necessary, to live in the same society as murderers, one of our most competent spokesmen, the Federal Minister of Justice, Mr. Bucher, of all people, damaged our reputation so much abroad that it will be difficult to repair. People abroad regard the question of the term of limitation not only as a legal one, but primarily as political and moral, and it is in this light that it should be discussed; morally we are bound to stand by it.

Confronting our unsubdued past unswervingly makes it difficult, of course, to deal with the present. It is unfair on many Germans that they should have to walk around like marked men. Neither East nor West make any distinction in the matter. Where

the term of limitation is concerned, the East is enjoying the opportunity of seeing us dangle helplessly at the mercy of those who know they have us where they want us. And, in the matter of military aid to Israel, it was the West, the Americans mainly, who sent us to the Near East front to haul the chestnuts from the fire, knowing how dependent we are on America. It would have been incomparably better if we had not allowed ourselves to be sent, but had gone of our own accord.

NASSER'S BLACKMAIL

And in the Near East, there is only one answer now to Nasser's blackmail: to take up diplomatic relations with Israel. And if Israel, moreover, demands military aid from the Federal Republic of all countries, even this seems logical.

The young Jewish State is exposed to a deadly threat. Mr. Ben Gurion, long the Prime Minister of Israel, is responsible for the maxim that "All that matters is to insure the survival of the survivors." We may believe him just as we might wish the world to believe him, when, as the most prominent of all Jews, he never tires of making a distinction between the Federal Republic and Hitler's Reich. His word may carry the greatest weight. But it is only when Germans and Jews have learned to face each other without embarrassment, that they will be able finally to settle their political misunderstandings without having to express their moral rearmament by drawing swastikas on synagogues, or calling for the boycott of German firms. It is still by our attitude to the Jews that we are going to be judged.

NATIONAL PROGRAM OF WATER RESEARCH

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the Senate turn to the consideration of Calendar No. 116, S. 22, and that it be laid down and made the pending business.

The PRESIDING OFFICER. The bill will be stated by title.

The LEGISLATIVE CLERK. A bill (S. 22) to promote a more adequate national program of water research.

The PRESIDING OFFICER. Is there objection to the present consideration of the bill?

There being no objection, the Senate proceeded to consider the bill, which had been reported with an amendment on page 2, line 3, after the word "with", to strike out "private firms and individuals" and insert "those private firms and individuals whose training, experience, and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects"; so as to make the bill read:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) section 200 of Public Law 88-379 of the Eighty-eighth Congress is repealed and

(b) That there is enacted in lieu thereof the following:

"SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1966, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with those private firms and individuals whose training, experience, and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects; and with

local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied."

Mr. MANSFIELD. Mr. President, what action has been taken on S. 22?

The PRESIDING OFFICER. The clerk will state the committee amendment.

The LEGISLATIVE CLERK. On page 2, line 3, after the word "with", to strike out "private firms and individuals" and insert "those private firms and individuals whose training, experience and qualifications are, in the judgment of the Secretary of the Interior, adequate for the conduct of water research projects".

The PRESIDING OFFICER. The question is on agreeing to the committee amendment.

The amendment was agreed to.

Mr. ANDERSON. Mr. President, the bill is in pretty much the same shape as when it was passed by the Senate, a year or so ago. It went to the House, and the House took out one of the provisions, and made provision that the President had to report back to Congress the things done by way of water research contracts. The President was reluctant to sign it under the doctrine of Executive privilege. There was a long discussion about it. We told the President that, if he signed the bill, we would correct it. What comes to us is S. 22. It was reported unanimously by the Senate committee. I hope there will be no objection to it.

Mr. YARBOROUGH. Mr. President, these amendments to the Water Resources Act of 1964 are a necessary step to insure that the provisions of the act will be better designed to carry out the program's worthy objective of insuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population.

These amendments would not change the purpose; but they would enlarge the scope of the program, and would remove some undesirable limitations from it. First, the title II authorization for grants, contracts, and matching arrangements with educational institutions, private foundations, and other institutions is changed from the \$1 million a year of the original act to \$5 million for the first year, increasing \$1 million annually for 5 years, and continuing at \$10 million annually thereafter.

Secretary Udall has notified the Senate that in the short life of the Office of Water Resources Research, 36 research proposals, totaling \$1,750,000, have been received. This experience indicates that the \$1 million ceiling is inadequate, and that the \$5 million authorization for the first year is justified.

This bill wisely drops the provision prohibiting support of title II research at institutions where there is a title I water resources-research institute. These institutes will become the Nation's centers for this type of research; and to artificially restrict support for them flies in the face of the objectives of the act.

When President Johnson signed Senate bill 2, of the 88th Congress, into law, he requested the deletion of the provision giving the Senate and the House Interior Committees veto power over title II grants and contracts. As the President pointed out, such a provision "violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches."

Now we are wisely deleting that provision.

Texas is one of the 28 States which will not have enough water by the year 2000 if current practices are continued. This program has widespread support in Texas. Six proposals from the Texas Water Resources Research Center have been submitted. These involve research into the water cycle, water and land management, and into qualitative, economic, and institutional aspects of water resources research.

The whole future of the southwestern part of the United States is vitally dependent upon water. No sounder investment of public funds can be made today.

The PRESIDING OFFICER. If there be no further amendment to be proposed, the question is on the engrossment and third reading of the bill.

The bill was ordered to be engrossed for a third reading, was read the third time, and passed.

Mr. MANSFIELD. Mr. President, I move to reconsider the vote by which the bill was passed.

Mr. ANDERSON. Mr. President, I move to lay that motion on the table.

The motion to lay on the table was agreed to.

AMENDMENT OF FEDERAL WATER POLLUTION CONTROL ACT AND CLEAN AIR ACT

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the Senate turn to the consideration of Calendar No. 117, S. 560. It will not take much time.

The PRESIDING OFFICER. The bill will be stated by title.

The LEGISLATIVE CLERK. A bill (S. 560) to amend the Federal Water Pollution Control Act as amended, and the Clean Air Act, as amended, to provide for improved cooperation by Federal agencies to control water and air pollution from Federal installations and facilities and to control automotive vehicle air pollution.

The PRESIDING OFFICER. Is there objection to the present consideration of the bill?

There being no objection, the Senate proceeded to consider the bill, which had been reported from the Committee on Public Works with an amendment, to strike out all after the enacting clause and insert:

That this Act may be cited as the "Federal Installations, Facilities, and Equipment Pollution Control Act".

TITLE I—AMENDMENTS OF FEDERAL WATER POLLUTION CONTROL ACT

Sec. 101. Section 9 of the Federal Water Pollution Control Act, as amended (33 U.S.C. 466h), is amended by inserting "(a)" after "Sec. 9." and by adding at the end of such section the following:

"(b) In order to prevent or control water pollution which may endanger the health or

welfare of any persons, any Federal department or agency having jurisdiction over any building, installation, or other property shall discharge wastes therefrom only in compliance with standards for such discharges as are established by the Secretary. Such standards applicable in any State shall (1) be established after consultation with appropriate officials of such State with respect thereto, (2) be consistent to the extent possible with any standards established by the Federal Government, by such State or by the municipality where applicable, and (3) not require a lesser degree of pollution control than such Federal, State, or municipal standards. The Secretary or his duly authorized representative is authorized to enter any such building, installation, or other property at reasonable times for the purpose of inspecting and investigating waste discharge practices.

"(c) There are hereby authorized to be appropriated necessary amounts to be expended for the installation, maintenance, and operation in Federal buildings, installations, and other property of waste disposal systems which are certified by the Secretary to have been designed in accordance with the standards promulgated under subsection (b). Such amounts shall be appropriated to the Federal departments or agencies concerned. Any Federal department or agency having under its jurisdiction any building, installation, or other property which does not meet standards established pursuant to subsection (b) shall request from the Congress such appropriations as may be necessary to comply with such standards.

"(d) No building, installation, or other property shall be constructed, otherwise prepared for use, or expanded by any Federal department or agency after the effective date of this subsection unless such construction, preparation, or expansion includes waste disposal practices determined by the Secretary to be adequate for the purposes of this section.

"(e) In order to assist in assuring appropriate maintenance and operation of waste disposal systems, the Secretary shall provide training in such matters to personnel of any Federal department or agency, at the request of the head of such department or agency.

"(f) Each Federal department or agency shall, not later than one year after the effective date of this section, report to the Secretary the waste disposal practices in effect at buildings, installations, and other property under its jurisdiction. The Secretary shall make a report to the President and the Congress not later than eighteen months after the effective date of this section, with respect to (1) Federal buildings, installations, and other property not in compliance with standards established pursuant to subsection (b) prior to the date of such report, (2) any reasons for such noncompliance, and (3) the Secretary's recommendations as to what action should be taken in order to accomplish compliance. The Secretary shall make a report to the President and the Congress each January 1 thereafter with respect to the effectiveness of actions taken by Federal departments and agencies to prevent and control waste pollution."

TITLE II—AMENDMENTS OF CLEAN AIR ACT

Sec. 201. Section 6 of the Clean Air Act (42 U.S.C. 1857e) is amended by adding at the end thereof the following:

"(c) Effective on and after October 1, 1966, no Federal department or agency shall purchase any automotive vehicle unless such vehicle is manufactured or equipped to prevent or reduce the discharge of pollutants from its exhaust in accordance with standards established by the Secretary. In establishing such standards, the Secretary may exempt special purpose vehicles from the provisions of this subsection."

SEC. 202. Section 7 of the Clean Air Act (42 U.S.C. 1857f) is amended—

(1) by striking out the last sentence in subsection (b); and

(2) by adding at the end thereof the following:

"(c) There are hereby authorized to be appropriated necessary amounts to be expended for the installation, maintenance, and operation in Federal buildings, installations, and other property of such devices as are certified by the Secretary to be adequate for the purposes of subsection (b). Such amounts shall be appropriated to the Federal departments or agencies concerned. Any Federal department or agency having under its jurisdiction any building, installation, or other property not in compliance with requirements established pursuant to subsection (b) shall request from the Congress such appropriations as may be necessary to accomplish compliance.

"(d) No building, installation, or other property shall be constructed, otherwise prepared for use, or expanded by any Federal department or agency after the effective date of this subsection unless such construction, preparation, or expansion includes air pollution control measures determined by the Secretary to be adequate for the purposes of this section.

"(e) In order to assist in assuring appropriate maintenance and operation of devices or other means of prevention or control of air pollution, the Secretary shall provide training in such matters to personnel of any Federal department or agency at the request of the head of such department or agency.

"(f) Each Federal department or agency shall keep the Secretary informed of air pollution control practices in effect at buildings, installations, and other property under its jurisdiction and shall promptly inform the Secretary of the absence of, or failure to institute practices necessary and adequate for the purposes of this section and the reason or reasons therefor. The Secretary shall report each January to the President and to the Congress on the status and effectiveness of actions taken under this section to prevent and control air pollution by such Federal departments and agencies.

"(g) The Secretary or his duly authorized representative is authorized to enter any such building, installation, or other property at reasonable times for the purpose of inspecting and investigating air pollution control practices."

Mr. MUSKIE. Mr. President, I ask unanimous consent that the committee amendment be considered as new text for the purpose of amendment.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. MUSKIE. Mr. President, I offer two technical amendments to S. 560, as amended. These are to insert the word "subsection" instead of the word "section" on page 7, line 25, and on page 8, line 5.

The PRESIDING OFFICER. The question is on the amendments. Without objection, the amendments are agreed to.

Mr. MUSKIE. Mr. President, Senate bill 560, designated as the Federal Installations, Facilities and Equipment Control Act, introduced by myself and 15 cosponsors, would provide a more effective basis for the control of water and air pollution from Federal buildings, installations, or other property. It would also provide that automotive vehicles purchased by the Federal Government, on and after October 1, 1966, be manufactured or equipped to prevent or re-

duce the discharge of pollutants from exhaust emissions. Certain special-purpose vehicles would be exempt from this provision.

I want to note at this point that devices have been tested and approved which are replacements for elements of the exhaust systems and which reduce harmful exhaust emissions. Also, the automobile industry has indicated that certain engine modifications that are commercially practicable could be made to reduce exhaust emissions.

The legislation was first suggested by the ranking minority member of the subcommittee [Mr. Boggs]. As in the case of other pollution control legislation, he has played a leading and constructive role in the development of this bill.

Briefly, S. 560, as reported by the Committee on Public Works, provides the following:

First. Establishes a procedure for setting standards for allowable discharges of waterborne waste from Federal installations.

Second. Authorizes the Secretary of Health, Education, and Welfare to make necessary inspections and investigations of waste discharge practices.

Third. Authorizes funds to install, maintain, and operate works to control water pollution and directs appropriate agencies to request necessary funds.

Fourth. Requires that all new or expanded installations include facilities to attain desirable degree of waste pollution control.

Fifth. Authorizes training of personnel to operate and maintain waste treatment works.

Sixth. Establishes a system for periodic reports to the President and the Congress on waste treatment control programs in Federal installations.

Seventh. Provides for automotive emission standards to be applied to all federally purchased automotive vehicles after October 1, 1966. Certain special-purpose vehicles may be exempted.

Eighth. Authorizes funds to install, maintain, and operate air pollution control devices and directs the appropriate agencies to request necessary funds.

Ninth. Requires that all new or expanded installations include air pollution control measures.

Tenth. Authorizes training of personnel to operate and maintain devices or other means of controlling air pollution.

Eleventh. Establishes a system for periodic reports to the President and the Congress on air pollution control practices and the effectiveness of actions taken.

Twelfth. Authorizes Secretary of Health, Education, and Welfare to inspect and investigate air pollution control practices at Federal Installations.

These expanded areas of Federal activity are essential to a meaningful national water and air pollution control program.

It would be less than fair if we require, through Federal legislation, that States, municipalities, corporations, and private individuals adhere to antipollution practices and not require the same degree of attention to the problems of

water and air pollution by our Federal agencies.

Much attention has been given to the water and air pollution problems by our Federal agencies; however, there is no real coordinated direction on their part in reducing the problem. Many agencies are operating under a variety of directives and instructions, but there is no direct congressional mandate to install the necessary waste treatment facilities, nor has any particular agency been designated to take the lead in assuring that proper action is taken. Most agencies are preoccupied with the problems of their basic mission and are unwilling or unable to obtain funds to correct the problems of water and air pollution.

The committee has been told by a number of State officials of their frustrations in attempting to have Federal agencies provide waste treatment works to meet desirable water quality standards, while at the same time, under their State laws, they have required that municipalities, corporations, and State-controlled institutions carry out practices designed to correct the problem. This same situation exists with respect to air pollution problems, although to a lesser extent because the air pollution program is only in its infancy. Nonetheless, coordinated direction needs to be given to the prevention and control of air pollutants from Federal installations.

With respect to the problem of controlling air pollution resulting from automotive vehicle exhausts, I would like to commend the General Services Administration for their forward-looking action in specifying exhaust standards to be met by certain types of vehicles purchased by it after October 1, 1966. However, there are other Federal agencies who have their own purchasing authority, and they, too, should be required to specify that exhaust emissions be controlled to desirable limits. Also, there needs to be a centralized Federal authority to study effects of emissions and means of controlling them.

The committee is aware that certain types of military vehicles, such as tanks and other combat vehicles, and certain types of vehicles used for civilian purposes should be exempt from the application of standards, since the control of emissions is not possible, practicable, or necessary. Also, at this time sufficient research has not been made to determine the extent of the effect of emissions from diesel-powered vehicles, nor means of effectuating control. Therefore, a provision has been included which would allow exemptions from standards in special instances.

It is my belief that this legislation is a meaningful step in the right direction on the road to more effective water and air pollution control and a healthy environment for all of us. I urge its passage by the Senate.

Mr. BOGGS. Mr. President, I would like to concur in the remarks just made by the junior Senator from Maine [Mr. MUSKIE], relative to S. 560, a bill to provide for improved control of air and water pollution from Federal installations and facilities.

89TH CONGRESS
1ST SESSION

S. 22

IN THE HOUSE OF REPRESENTATIVES

MARCH 26, 1965

Referred to the Committee on Interior and Insular Affairs

AN ACT

To promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That (a) section 200 of Public Law 88-379 of the Eighty-
4 eighth Congress is repealed and

5 (b) That there is enacted in lieu thereof the following:

6 “SEC. 200. There is authorized to be appropriated to the
7 Secretary of the Interior \$5,000,000 in fiscal year 1966,
8 increasing \$1,000,000 annually for five years, and continuing
9 at \$10,000,000 annually thereafter from which he may make
10 grants, contracts, matching, or other arrangements with edu-
11 cational institutions, private foundations, or other institutions;

1 with those private firms and individuals whose training, ex-
2 perience and qualifications are, in the judgment of the Secre-
3 tary of the Interior, adequate for the conduct of water
4 research projects; and with local, State, or Federal Govern-
5 ment agencies, to undertake research into any aspects of
6 water problems related to the mission of the Department of
7 the Interior, which may be deemed desirable and are not
8 otherwise being studied."

Passed the Senate March 25, 1965.

Attest:

FELTON M. JOHNSTON,

Secretary.

AN ACT

To promote a more adequate national program
of water research.

MARCH 26, 1965

Referred to the Committee on Interior and Insular
Affairs

DIGEST of Congressional Proceedings

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HIGHLIGHTS: House committee voted to postpone action on bill to increase soybean production. House committee voted to report Oregon Dunes National Seashore bill and bill to expand water research programs. Rep. Nelsen proposed investigation of CCC "grain dumping" activities. Rep. Gilbert criticized school milk and school lunch budget cuts.

HOUSE

1. **PERSONNEL.** Passed as reported H. R. 10607, to provide reimbursement of additional moving expenses of Federal employees (pp. 6275-88). Rejected an amendment by Rep. Kunkel which would have made provisions of the bill retroactive to Jan. 1, 1965 (pp. 6287-8). As passed the bill includes provisions as follows: Permits reimbursement for the transportation of up to 11,000 pounds of household goods and personal effects, rather than 7,000 pounds. Permits greater use of Government bills of lading in domestic shipments of

household goods, rather than the use of the commuted rates system. Provides that an employee may receive per diem allowances in lieu of subsistence for members of his immediate family while en route to a new official station. Provides that an employee may receive per diem allowances in lieu of subsistence and round-trip transportation expenses of himself and his spouse for travel to seek permanent residence quarters at a new official station. Provides that the employee can be reimbursed for the subsistence expenses of himself and his immediate family while occupying temporary quarters. Authorizes reimbursement for certain expenses of selling and buying real estate and settlement of unexpired leases when these expenses must be paid by the employee, such as legal fees and commissions, document stamps and transfer taxes, closing or settlement costs, and the like as would be prescribed by regulation. Provides under regulations to be prescribed by the President, for reimbursement, over and above reimbursement otherwise received under the act, an amount not to exceed 2 weeks' basic compensation for employees with an immediate family and 1 week's basic compensation for single movers. Provides that under regulations to be established by the President, when transferred employees or new appointees are assigned to permanent stations in isolated locations in the continental United States which do not have residence quarters, they may be reimbursed for storage of household goods for up to 3 years or their household goods may be stored in Government-owned facilities if this is more economical. Provides that the cost of reimbursing employees for expenses may be paid partly or wholly by either the department from which the employee is transferred or to which he is transferred when a transfer between departments results from a reduction in force or a transfer of function. Provides that persons separated from the service in a reduction in force or transfer of function for whom the Government would have paid the expenses and allowances of transfer at the time they were still employed can receive such payments if they are appointed or reinstated to a nontemporary position in the Federal service within 1 year. Provides that, in order to receive the expenses allowed under this bill, employees must agree in writing to remain in Government service for at least 1 year after they have moved, unless separated for reasons beyond their control and acceptable to the agency concerned.

Rep. Quillen inserted a letter from the Commander of the Veterans of Foreign Wars questioning whether the Civil Service Commission is "properly discharging the mandate of Congress that it enforce the Veterans' Preference Act." p. 6303

2. SOYBEANS. The "Daily Digest" states that the Agriculture Committee "voted to postpone action on" H. R. 12798, to permit soybean production on acreage diverted from or allotted to other crops. p. D238
3. RECREATION; FORESTRY. The Interior and Insular Affairs Committee voted to report (but did not actually report) with amendment H. R. 7524, to provide for the establishment of the Oregon Dunes National Seashore, Ore. (p. D239). The committee was granted permission to file a report on the bill by midnight, Mar. 26 (p.6272).
4. WATER RESEARCH; ELECTRIFICATION. The Interior and Insular Affairs Committee voted to report (but did not actually report) H. R. 3606, with amendment, to promote a more adequate national program of water research, and H. R. 7406, with amendment, to authorize Interior to construct a third powerplant at the Grand Coulee Dam, Columbia Basin project, Wash. (p. D239). The



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No. 50

Senate

The Senate was not in session today. Its next meeting will be held on Friday, March 25, 1966, at 12 o'clock meridian.

House of Representatives

WEDNESDAY, MARCH 23, 1966

The House met at 12 o'clock noon.

Rev. Dr. Martin L. Koehneke, president of Concordia Teachers College, River Forest, Ill., used the following reading from Scripture and offered the following prayer:

Whosoever will be great among you, let him be your minister; and whosoever will be chief among you, let him be your servant; even as the Son of Man came not to be ministered unto, but to minister, and to give His life a ransom for many.—St. Matthew 20: 26–28.

Grant us, O Father in heaven, the gift of penitent and believing hearts, so that we may know Thee as the one who sent Thy Son to serve us, to save us from our sins, and to give His life a ransom for us all.

Help us to know ourselves, as Thou knowest us. Show us Thy strength in our weakness, Thy pardon for our wrongdoing, Thy guidance for our faltering steps, Thy pleasure in doing Thy will.

Grant purity to our aspirations, integrity to our leadership, and nobility to our service, so that our Nation and the world may observe us walking in Thy fear and in Thy favor.

Abide with us in Thy love, dwell in us by Thy grace, and sustain us by Thy power, for the sake of Jesus Christ, Thy Son, our Lord. Amen.

THE JOURNAL

The Journal of the proceedings of yesterday was read and approved.

MESSAGE FROM THE SENATE

A message from the Senate, by Mr. Arrington, one of its clerks, announced that the Senate agrees to the amendments of the House, with amendments, to a bill of the Senate of the following title:

S. 1404. An act to establish uniform dates throughout the United States for the commencing and ending daylight saving time in those States and local jurisdictions where it is observed, and for other purposes.

The message also announced that the Senate had passed a bill of the following title, in which the concurrence of the House is requested:

S. 801. An act to improve the balance-of-payments position of the United States by permitting the use of reserved foreign currencies in lieu of dollars for current expenditures.

FILING OF REPORT ON SECOND SUPPLEMENTAL APPROPRIATION BILL FOR FISCAL YEAR 1966

Mr. MAHON. Mr. Speaker, I ask unanimous consent that the Committee on Appropriations may have until midnight Friday, March 25, to file a report on the second supplemental appropriation bill for the fiscal year 1966.

The SPEAKER. Is there objection to the request of the gentleman from Texas?

There was no objection.

Mr. BOW reserved all points of order on the bill.

SUPPLEMENTAL DEFENSE APPROPRIATIONS, FISCAL YEAR 1966

Mr. MAHON. Mr. Speaker, I ask unanimous consent to take from the Speaker's table the bill (H.R. 13546) making supplemental appropriations for the fiscal year ending June 30, 1966, and for other purposes, with amendments of the Senate thereto, and concur in the Senate amendments.

The Clerk read the title of the bill.

The Clerk read the Senate amendments, as follows:

Page 8, line 5, strike out "After June 30, 1965" and insert "During the current fiscal year".

Page 8, line 14, strike out "years" and insert "year".

Page 8, line 14, strike out "and 1967".

The SPEAKER. Is there objection to the request of the gentleman from Texas?

Mr. BOW. Mr. Speaker, reserving the right to object, would the distinguished gentleman from Texas advise the House as to what these amendments accomplish?

Mr. MAHON. The gentleman from Ohio is aware of the fact that three small alterations were made by the other body in the general provisions of the bill which, in my judgment, improve the legislation. Members should be aware that there were no changes in the appropriation items—there is no difference between the bills as to the provision of the appropriations themselves.

The first change made by the other body provides that the authority granted in section 101 of the general provisions will be confined to the fiscal year 1966, the current fiscal year.

With respect to section 102, the language was also amended so as to apply only to fiscal year 1966.

These changes restrict in time the authority which was provided by sections 101 and 102 in the House version of the bill. I believe that all Members of the House would be in favor of this tightening up of the language of the bill.

The gentleman from California [Mr. LIPSCOMB], the ranking minority member on the Subcommittee on Defense Appropriations which handled the hearings on most of this legislation, has been consulted and agrees, as I understand, with this position. I know of no objections, by any Members, to these amendments. Therefore, we might approve the legislation today, and send it immediately to the President.

Mr. BOW. Mr. Speaker, I have consulted with the gentleman from California [Mr. LIPSCOMB], the ranking

minority member of the Defense Subcommittee, and he approves the amendments made in the Senate. He feels that they would strengthen the bill.

Mr. LAIRD. Mr. Speaker, will the gentleman yield?

Mr. BOW. I yield to the gentleman from Wisconsin.

Mr. LAIRD. I thank the gentleman for yielding to me. The amendments to section 102 go along with the earlier amendments that were jointly sponsored during House consideration by the gentleman from Texas and the gentleman from California. The section 102 amendments that were adopted here on the floor, and those pending in the bill as passed by the other body, I think correct adequately the point that was made before the Rules Committee when this bill was up for consideration. I think they should be concurred in by the House.

Mr. BOW. Mr. Speaker, I withdraw my reservation of objection.

The SPEAKER. Is there objection to the request of the gentleman from Texas?

There was no objection.

The Senate amendments were concurred in.

A motion to reconsider was laid on the table.

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

Mr. ASPINALL. Mr. Speaker, I ask unanimous consent that the Committee on Interior and Insular Affairs may have until midnight, March 26, to file a report on the bills H.R. 7524, H.R. 7406, and H.R. 3606.

The SPEAKER. Without objection, it is so ordered.

There was no objection.

THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE IS CRUEL AND COSTLY TO OUR ELDERLY CITIZENS

(Mr. O'HARA of Illinois asked and was given permission to address the House for 1 minute.)

Mr. O'HARA of Illinois. Mr. Speaker, the Health, Education, and Welfare Department, through its Social Security Administration, is being cruel and costly to its elderly citizens on the matter of birth certificates.

Most members of our generation who were not born in big towns have no recorded birth certificates. The Government very wisely decided many years ago that in such cases a birth certificate could be issued by the county on a close relative's affidavit.

I am told the Social Security Administration is now refusing to accept such birth certificates and is demanding that applicants pay \$4 in advance for a delayed check of census records, or \$5 in advance for an immediate search of the records.

I should find it difficult to understand the complicated instructions, and I am sure that the average retired person, even if he had the money to shoot on such a project, would find the instructions incomprehensible.

TRIBUTE TO THE CAPITOL POLICE FORCE

(Mr. SIKES asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. SIKES. Mr. Speaker, now that the shouting is over and blame placed on the Capitol Police for a regrettable incident, which probably no police force could have averted, let us appraise the facts. Most of us will admit the Capitol Police force is made up of good men who give good service. They are courteous and helpful, and they can be firm when the occasion requires. Certainly it is to their credit that very few incidents involving lawbreaking occur on Capitol Hill.

They are not professionals; nor can they be, under the patronage system. That is not the fault of the force. However, lawbreaking occurs despite the best efforts of the best professional policemen—a great deal of it right here in Washington where there is a good professional force. It just is not possible to prevent all violence, regardless of the caliber or organization of the police officials. Ours do a good job. They are a faithful and dedicated force, and they should have a pat on the back for the effective performance which they give.

USE OF KREBIOZEN BY CANCER PATIENTS

(Mr. CLARK asked and was given permission to address the House for 1 minute.)

Mr. CLARK. Mr. Speaker, Members of the House, yesterday I introduced a bill to permit all patients currently using the drug krebiozen to purchase it in Illinois for use in any State until a clinical test on cancer patients be completed.

There are in the district that I represent several dozen cancer patients who are taking krebiozen at this time. Until 2 months ago they were able to take it regularly. They have gone to Illinois to purchase this drug krebiozen.

Whether or not some of us believe it is an authentic cancer cure is not the point. The point is that every one of us should live up to his responsibilities and unite behind this bill to make it possible for patients to obtain this drug.

In the past 2 or 3 or 4 years, doctors have operated on these patients and have declared that the patients might as well go home and pass the time for the next 2 or 3 months and then die. Since then, these patients who have been using krebiozen are still living. I say it is our responsibility to see that they are able to purchase this drug krebiozen until there is a good clinical test.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

Mr. ROGERS of Texas. Mr. Speaker, I ask unanimous consent that the Committee on Interstate and Foreign Commerce may be permitted to sit during general debate this afternoon.

The SPEAKER. Without objection, it is so ordered.

There was no objection.

WEST GERMANY PLANS TO BUILD STEEL MILL FOR RED CHINA

(Mr. DYAL asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. DYAL. Mr. Speaker, the recent news that West Germany—our NATO ally—is planning to build a steel mill for Red China is causing great concern. I strongly object to this behind-the-back deal. While I have a large steel industry in my congressional district, this is not a steel issue—it is a loyalty issue. After all the billions we pumped into West Germany to rebuild it after the war, how can that nation, with good conscience, help to build the warmaking potential of the aggressor in Asia?

I consider it imperative that a strong protest be made by the U.S. Government, and a thorough restudy of the proposed plans before West Germany carries them out.

PERSONAL ANNOUNCEMENT

Mr. COHELAN. Mr. Speaker, on roll-call No. 44, on yesterday, I was absent on official business with the Secretary of Housing and Urban Development. Had I been present, I would have voted "yea." I ask that the RECORD so show.

THE HOMEBUILDING INDUSTRY IN CALIFORNIA

(Mr. HANNA asked and was given permission to address the House for 1 minute.)

Mr. HANNA. Mr. Speaker, I have sought a special order on Wednesday next, the 30th of March, to bring to the attention of this body and to the consideration of the Chief Executive and the administrative agencies involved, the serious condition facing the homebuilding industry in the State of California in particular, and in the Western States in general.

I call upon my colleagues from my own State and from the other Western States to join me here in this important discussion. While all around there is talk of inflation, in this homebuilding sector of the Western States economy there is already the clear mark of recession. Every phase of the construction business, which accounts for \$8 billion in California's gross national product, is down from last year. But the homebuilding industry is dramatically and disturbingly reduced.

Through March 1 the housing construction activity is 44 percent below the activity for 1965. The situation is desperate. It needs the understanding and attention of this body and the attention of the housing and home financing agencies of the Federal Government.

OEO TEACHES CALIFORNIA A STRANGE LESSON IN SUBTRACTION

(Mr. BELL asked and was given permission to address the House for 1 minute and to revise and extend his remarks.)

Mr. BELL. Mr. Speaker, today I want to recount for my colleagues the bewil-

DIGEST of Congressional Proceedings

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C. 20250
OFFICIAL BUSINESS

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF AGRICULTURE

OFFICE OF BUDGET AND FINANCE
(FOR INFORMATION ONLY;
NOT TO BE QUOTED OR CITED)

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89th-2nd; No. 53

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HIGHLIGHTS: House subcommittee reported bill for rural-renewal loans and cost-sharing for recreation facilities. House committee reported (on Mar. 26) bills to establish Oregon Dunes National Seashore and to expand water research program. House received Budget Bureau's proposed bill for review of national water resources programs. Rep. Bow criticized ASC county committee postcard urging farmers to sign up for feed grain and cotton programs.

HOUSE

1. RECREATION LOANS. The Subcommittee on Conservation and Credit of the Agriculture Committee voted to report to the full committee H. R. 13669, to amend title III of the Bankhead-Jones Farm Tenant Act so as to authorize rural-renewal loans to be made for recreation facilities. p. D256
2. SECOND SUPPLEMENTAL APPROPRIATION BILL, 1966. The Appropriations Committee formally reported this bill, H. R. 14012 on Mar. 25 during adjournment (H. Rept. 1349) (p. 6531). See Digest 52 for items of interest.

3. WATER RESOURCES. The Interior and Insular Affairs Committee reported with amendment (on Mar. 26 during adjournment) H. R. 3606, to promote a more adequate national program of water research (H. Rept. 1350). p. 6531
~~Received from the Budget Bureau a proposed bill to provide for a comprehensive review of national water resource problems and programs; to Interior and Insular Affairs Committee. p. 6531~~
4. RECREATION; OREGON DUNES. The Interior and Insular Affairs Committee reported with amendment (on Mar. 26 during adjournment) H. R. 7524, to provide for the establishment of the Oregon Dunes National Seashore, Ore. (H. Rept. 1351). p. 6531
5. FOREIGN TRADE; TARIFFS. The Ways and Means Committee reported the following bills: H. R. 8376, without amendment, to make permanent the existing duty-free treatment of certain corkboard insulation (H. Rept. 1353); H. R. 10998, without amendment, to continue for a temporary period the existing suspension of duty on heptanoic acid (H. Rept. 1354); H. R. 12328, with amendment, to extend the period during which certain tanning extracts, and extracts of hemlock or eucalyptus suitable for use for tanning, may be imported free of duty (H. Rept. 1357); H. R. 12461, without amendment, to extend until Sept. 5, 1969, the existing suspension of duty on certain istle (H. Rept. 1358); and H. R. 12463, without amendment, to extend until June 30, 1969, the suspension of duty on crude chicory and the reduction of duty on ground chicory (H. Rept. 1359) p. 6531
6. PERSONNEL; IMPORTS. The Ways and Means Committee reported with amendment H. R. 12864, to extend for a temporary period the existing provision of law relating to the free importation of personal and household effects brought into the U. S. under Government orders (H. Rept. 1361). p. 6531
7. FEED GRAINS; COTTON. Rep. Bow criticized the ASC county office in Henderson, Tenn., for sending a postcard to farmers urging them to sign up for the feed grain and cotton programs. p. 6520
8. HOUSING. Rep. Patman inserted an address by Sen. Sparkman at the annual convention of the National Housing Conference reviewing current housing legislation. pp. 6516-7
9. POVERTY. Rep. Quie criticized administration of the poverty program, particularly the Headstart program in various schools. pp. 6523-7
10. AGRICULTURAL CONSERVATION PROGRAM. Received from this Department the annual report on the agricultural conservation program. p. 6530
11. FORESTRY. Received from GAO "a report of review of procedures for measuring national forest timber in the Pacific Northwest region..."; to Government Operations Committee. p. 6530
12. ELECTRIFICATION. Received the annual report of the Federal Power Commission. p. 6531
13. DAIRY. Received from GAO "a report of operation of a dairy farm by the U. S. Naval Academy." p. 6530

PROMOTING A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

MARCH 26, 1966.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. ROGERS of Texas, from the Committee on Interior and Insular Affairs, submitted the following

R E P O R T

[To accompany H.R. 3606]

The Committee on Interior and Insular Affairs, to whom was referred the bill (H.R. 3606) to promote a more adequate national program of water research, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

Strike out all after the enacting clause and insert the following language:

That section 200 of the Water Resources Research Act of 1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to read as follows:

"SEC. 200. (a) There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State and Federal government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

"(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die."

2 A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

SEC. 2. The last paragraph of section 104 of said Act is hereby repealed and a new section 307 is added to that Act reading as follows:

"SEC. 307. The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor."

H.R. 3606 was introduced by Mr. O'Brien of New York. Similar bills were introduced by Mr. Hanley (H.R. 5930), by Mr. Pickle (H.R. 6282), and by Mr. Ashley (H.R. 8916). S. 22, passed by the Senate, was also before the committee.

PURPOSE

H.R. 3606 is designed to promote a more adequate national program for water research. This purpose would be accomplished by amending the Water Resources Research Act of 1964 to provide basic authority to the Secretary of the Interior for a program of extramural research into all aspects of water problems relating to the mission of the Department of the Interior. Under this program, research grants or contracts could be made on a matching or other basis with State water resources research agencies or other government agencies or with universities or other educational institutions or with private firms or individuals in order to fulfill the requirements of a sound research program. The objective of this program is to bring to bear on our national water problems the talents and research competence of our best trained scientists and the use of the best facilities available wherever they may be located. As amended by the committee, H.R. 3606 would authorize the appropriation of \$85 million over a 10-year period.

BACKGROUND

A brief background statement on this legislation is pertinent to its consideration.

The language of H.R. 3606, as introduced, was included as title II of the legislation introduced in the 88th Congress which was later enacted as Public Law 88-379 and is referred to as the Water Resources Research Act of 1964. However, as finally passed, title II of the 1964 act authorized only a \$1 million a year program for a 10-year period and included language which gives either the House or Senate Interior and Insular Affairs Committee authority to bar appropriations to fund research projects. At the time President Johnson signed the Water Resources Research Act into law on July 17, 1964, he stated his objection to this provision as violating "the spirit of the doctrine of separation of power between the executive and legislative branches." No funds have been requested by the administration to implement title II of the 1964 act.

The language of title II of the present act is language adopted by conference committee. The Senate approved title II of S. 2 of the 88th Congress as originally introduced and supported by the administration. The House deleted title II of S. 2 in its entirety. The Interior and Insular Affairs Committee recommended this action to the House after extensive hearings and consideration of the legis-

lation. The committee's report on S. 2 indicates there were several reasons for the committee's action. First, the committee favored a more modest beginning for this new program calling for Federal financial participation on non-Federal water research. Second, the committee questioned the desirability of adopting the broad general language of title II which provided no controls or guidelines to the Secretary in its administration. Third, the committee concluded that the testimony failed to show the immediate need for the authority provided in title II.

In conference, agreement was reached upon the language which is presently in the act. The House conferees accepted this compromise language as a means of determining the kind of research program that would be initiated. It was the thought of the House conferees that implementation of the \$1 million a year program would indicate its merit and whether it should be expanded and extended. Unfortunately, as already mentioned, the program under the present title II has not been implemented.

Early in the 89th Congress, legislation was introduced in both bodies to remove the title II language and replace it with the language the House had removed in the 88th Congress. The Senate has again indicated its approval of this language by its passage on March 25, 1965, of S. 22.

PRESENT PROGRAM

Although title II of the Water Resources Research Act of 1964 has not been implemented, the remainder of the program authorized by that act has been initiated and is off to a very good start. The committee conducted a full review of the going program at the time it held hearings to consider H. R. 3606 and similar bills. The committee has been favorably impressed by the administration of this program to date, including the timely establishment of the water resources research institutes in each State and the research work that these institutes are doing. The committee is also pleased with the leadership exemplified by Dr. Roland R. Renne, Director of the Office of Water Resources Research in the Department of the Interior.

In addition to providing for establishing water resources research institutes in each State, the 1964 act included provisions requiring the clarification of Federal agency responsibilities for water research and for coordinating all Federal water resources research activities. By Executive order, dated October 24, 1964, the President has given this responsibility to the Office of Science and Technology and the Federal Council for Science and Technology. A Committee on Water Resources Research has been established and staffed and it appears that progress is being made toward the elimination of duplication and waste in this field. Thus, the committee is pleased with the actions taken to implement this provision in the 1964 act.

NEED FOR WATER RESEARCH

Water development is the matching of water supply to existing and projected demands for water and water service. It is the ever-increasing demands upon our limited supplies throughout the Nation that have pointed up the importance of research in this process. Over the years, the nature of our water problems has changed and the size and scope of the solutions have increased until, today, far greater

demands are pressing upon both our water resources and the technology required to meet our varied water needs.

In the past, our Nation's available water supplies were plentiful and we let ourselves become too dependent upon nature to meet our needs. We also became wasteful of our supplies. We have expected our streams and ground water sources not only to meet the needs of our expanding population for food, fiber, and industrial processing, but also, at the same time, to carry off the waste products of our homes, industries, and farms. The result has been serious shortages of usable water in many parts of our Nation and the conclusion that our water problems may be expected to become more serious in the future. Research, of course, is not itself the answer to all our water problems but it will help provide the answers we need. It has become quite clear that, if we are to find the solutions necessary to meet this Nation's growing water problems, we must have a continuing and effective water resources research program.

Our water research needs are directly related to the multitude of water problems which prevail in almost every part of the United States. To improve our ability to attack these problems, we need more information than we now possess, greater understanding of natural processes in the hydrologic cycle and of the relations between human beings and water, and better methods for analysis of existing information. Water resources research can be defined as thought and action required to meet these needs.

Just a few days ago, on March 18, the President transmitted to the Congress a report from the Federal Council for Science and Technology entitled "A Ten Year Program of Federal Water Resources Research." The President's message accompanying the report stated:

We must seek the knowledge and understanding essential to support our efforts. We must apply the very best of science and technology to solve our mounting water resource problems. We must continue our search for bold, new ideas. A strong, well planned program of research has now become a national necessity. The growth of knowledge in this vital area is important to our future.

The report of the Federal Council sets out the specific goals of Federal research in water resources as follows:

(1) To develop methods for conserving and augmenting the quantity of water available.

(2) To perfect techniques for controlling water so as to minimize erosion, flood damage, and other adverse effects.

(3) To develop methods for managing and controlling pollution so as to protect and improve the quality of the water resource.

(4) To develop and improve procedures for evaluating water resource development and management so as to maximize net socioeconomic benefits.

(5) To understand the nature of water, the processes which determine its distribution in nature, its interactions with its environment, and the effects of man's activities on the natural processes. This is basic to the successful prosecution of items 1 through 4.

(6) To develop techniques for efficient, minimum-cost design, construction, and operation of engineering works required to

implement the water resources development program. Overriding consideration of effectiveness and safety, and of economy in connection with the already huge and mounting costs of executing and operating water resource developments that are rapidly growing in number, size, and complexity, require the best efforts we can bring to bear on these problems.

(7) To develop new methods for efficient collection of the field data necessary for the planning and design of water resource projects.

The program which H.R. 3606 would authorize would assist in attaining these goals.

JUSTIFICATION AND SUPPORT FOR PROGRAM AUTHORIZED BY H.R. 3606

All of the testimony which the Committee on Interior and Insular Affairs received in the hearings on H.R. 3606 and similar bills was designed to show that the program originally envisioned for taking advantage of non-Federal scientific talent and research competence in the water field would be incomplete without that part of the program originally included under title II. The committee received testimony showing that, although considerable progress has been made in working out arrangements in many of the States whereby several universities or other educational institutions will cooperate in the research work of the State research institute, there are still many very strong and competent universities not in the program and with no prospect of being in the program except under the title II authority. In other words, the present program is not tapping anywhere near the total research and training competence of our universities. For example, it was pointed out that the eight major universities in Illinois can not participate in the work of the one institute at the University of Illinois with its limited funds without excessive fragmentation of the institute's allotment under the present program. The same is true in California where there are nine separate campuses in the University of California system, not to mention Stanford, the University of Southern California, and the California State Institute of Technology, all of which have research and training competence in the water field. Other examples mentioned included the universities and colleges in the States of New York and Massachusetts.

It was pointed out also in the testimony that in addition to the fact that the present program deprives us of the research competence at many of our excellent universities, it also prohibits participation in the program of many nonacademic, nonprofit organizations such as the Research Institute of the Illinois Institute of Technology, Stanford Research Institute, Mellon Institute, Battelle Memorial Institute, Spindletop Research Center at Lexington, Ky., Drexel Institute of Technology, Houston Research Institute, and others. These nonprofit research groups, through years of experience, have developed considerable competence in certain specific areas in the broad research field of water resources.

The present program also deprives us of the research competence of organizations such as Melpar, Inc., North Star Research & Development Corp., Franklin Institute Research Laboratories, Technology Planning Center, Inc., Cyrus William Rice & Co., Itek Corp., Midwest Research Institute, Hydronautics, Inc., and Geoscience Associates, Inc., just to mention a few that have acquired a high degree of com-

petence in the development of instrumentation, mathematical modeling, and systems analysis. Work such as this is a specialty of a few organizations with years of experience—experience which is not available in the universities.

In addition, under the proposed title II authority some State or Federal agency or even individual research could be funded. This cannot be done under the present program.

Of course, the 51 State institutes established under the present program also could participate in the title II program. Some of the best talent and research competence and laboratory facilities will be found within these institutes and it is important that the 51 State institutes be permitted to participate in the title II program.

During the committee hearings, many eminent educators and scientists presented testimony strongly endorsing this legislation in order to broaden and strengthen the water resources research program. The National Association of State Universities & Land-Grant Colleges was represented by four university presidents including Dr. William E. Morgan, president of the Colorado State University and chairman of the water resources committee of the association. Favorable testimony also was received from representatives of many additional colleges and universities, the Council of State Governments, established water resources research institutes not presently participating in the program, as well as many nonacademic and private research organizations. This legislation also is strongly endorsed by the administration.

COMMITTEE AMENDMENTS

The committee rewrote the language of the bill to incorporate three major changes:

First, the program is limited to 10 years beginning in fiscal year 1967 and running through fiscal year 1976. A total of \$85 million would be authorized to be appropriated during this 10-year period as follows: Fiscal year 1967, \$5 million; fiscal year 1968, \$6 million; fiscal year 1969, \$7 million; fiscal year 1970, \$8 million; fiscal year 1971, \$9 million; and fiscal years 1972–76, \$10 million.

The second change requires that no contract or other arrangement be entered into until 60 calendar days after it had been submitted to the Congress and during which Congress is in session.

The third change broadens the reporting requirement in the present act which only requires an annual report to the Congress with respect to the expenditures and work of the institutes. This provision in section 104 of the present act is repealed and a new provision is added under title III which requires a report to the President and to the Congress on or before March 1 of each year giving a complete accounting for appropriated funds during the preceding calendar year as well as a report on the results expected and conclusions reached for projects financed under sections 101 and 200. The report also would include an account of the work of the institutes.

All three of these major changes were adopted by the committee to carry out what it considers to be its oversight responsibilities for this water resources research program. The committee felt that limiting the life of the program to 10 years would provide an opportunity for an overall review of accomplishments and needs at the end of that period in order to determine whether it should be extended. As for the

provision that the contracts and other arrangements be submitted to the Congress—a frequent provision in other legislation—this would afford the committee an opportunity to review the research proposals and resolve any questions which the committee may have with respect to them before the contracts or other arrangements are entered into. The third change to broaden the reporting requirement will make available a full annual report covering the entire program and providing an annual accounting for the appropriated funds.

COMMITTEE CONCLUSIONS AND RECOMMENDATION

The Committee on Interior and Insular Affairs of the House of Representatives is now giving its approval to the title II program which it rejected 2 years ago. However, it is doing so only with certain limitations it has placed in the bill; i.e., a 10-year life, a requirement for submission to Congress of all contracts or other arrangements for a 60-day review prior to execution, and a detailed annual report. Based upon the excellent and complete testimony which the committee received, the committee is now of the opinion that the title II program is needed in order to take advantage of all available scientific talent and research competence in the water field in resolving our Nation's ever-growing water problems. Contributing also to the committee's approval is the excellent start which has been made with respect to the program authorized 2 years ago and the committee's confidence in Dr. Ronald R. Renne, Director of the Office of Water Resources Research.

The committee received testimony that the many cooperative arrangements that have been worked out among universities would not have been possible had the title II program been fully authorized 2 years ago. Other testimony and evidence indicates that the 2-year delay in the title II authorization has been beneficial to the overall program and has been a big factor in getting it off to a good start.

The committee still is not satisfied with the broad general language of the authority given to the Secretary of the Interior and recommends that careful attention be given to the preparation of regulations for the implementation of this program in order to eliminate possible inequities, criticisms and abuses.

The Committee on Interior and Insular Affairs of the House of Representatives recommends that H.R. 3606, as amended, be enacted.

EXECUTIVE COMMUNICATION

The report of the Department of the Interior recommending the enactment of this legislation follows:

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., May 28, 1965.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. ASPINALL: This responds to your request for the views of the Department of the Interior on H.R. 3606, H.R. 5930, and H.R. 6282, bills to promote a more adequate national program of water research.

We recommend that one of the bills be enacted.

These bills would amend title II of the Water Resources Research Act of 1964. Under title II of the Water Resources Research Act the Secretary of the Interior is authorized to support a program of research into aspects of water problems related to missions of the Department of the Interior. Appropriations of \$1 million per year for 10 fiscal years commencing with fiscal year 1965 are authorized for the program. Money appropriated pursuant to this authority may be used for grants, contracts, matching or other arrangements with educational institutions (except those at which a water resources research institute is maintained pursuant to title I of this act), private institutions, private firms, or individuals and government agencies, local, State and Federal. The act provides that appropriations may be made to finance grants, contracts and other arrangements only if they are not disapproved by the Senate or House Committees on Interior and Insular Affairs.

These bills would not change the purpose of title II of the Water Resources Research Act, but they would enlarge the scope of the program and remove some limitations from it. The bills would make four important changes in title II.

First, appropriations would be authorized at the level of \$5 million for fiscal year 1966. The authorization would increase by \$1 million annually until the level of \$10 million was reached. The authorized ceiling would remain at \$10 million per year thereafter.

Second, the 10-year limit on the authorization for appropriations to carry out title II would be eliminated.

Third, the prohibition against support of research at educational institutions where there is a title I water resources research institute would be dropped.

Fourth, the provisions for legislative committee review of proposed grants, contracts, and other arrangements would be dropped.

We believe that all four of the changes that these bills would effect are justifiable and would benefit the program. We, therefore, support the bills.

As to the first change, in the short life of the Office of Water Resources Research (established in the Department to administer title II), we have received 36 proposals for research activity into water resource problems affecting the Department's missions. These proposals aggregate \$1,750,000 and come from responsible, qualified individuals and organizations. Many of them would be accepted if it were possible to do so within the limitations of the appropriations available. This outpouring of proposals is particularly striking in view of the fact that appropriations under title II have not yet been made. When the limit of authorized appropriations was established at \$1 million per year it could not be known with certainty what level of activity could be anticipated. In supporting the bill that became the Water Resources Research Act the Department was not in a position to predict what level of response would be stimulated by the act. Experience based on the number of proposals received to date demonstrates that \$1 million per year is inadequate, and suggests that an authorization of \$5 million to support the first year's research program is justified. As the program becomes better known, and as more talent and capacity is developed over the next few years, we expect promising proposals to increase, thus justifying a gradually rising appropriation ceiling to \$10 million per year by 1971.

As for establishing the authorization for appropriation without a finite time limit, at least two points should be made: (1) much of the research that will be undertaken will be of a long-range nature and the prospect of long-term support for it must exist if it is to commence; and (2) water problems will persist and the capacity to analyze and deal with them will grow in the future; this Department's mission will become more important and complex as time goes on and it is reasonable that the program be authorized on a continuing basis.

The third objective of these bills—dropping the prohibition against associating with institutions maintaining water resource research institutes—makes eminent sense. These institutes, and the educational centers, where they are located are likely to be the loci of much of the water resources research capability in the Nation. The Secretary should have the authority to look to that capability to accomplish the purposes of title II. The provision in the bills that support may not be given to research projects otherwise being studied will insure that duplication will not result from dropping this provision of the act.

Fourth, the bills would eliminate the authority of the Committees on Interior and Insular Affairs of the House of Representatives and Senate to bar appropriations to fund research projects proposed to be undertaken pursuant to title II of the act.

The last sentence of section 200, title II, requires that each proposed grant or other arrangement be submitted to the Congress to lie before the Committees on Interior and Insular Affairs of the House of Representatives and Senate for 60 days. Appropriations to finance these grants or other arrangements are permitted under the act only if neither committee disapproves them within the 60-day review period.

In approving the Water Resources Research Act the President made reference to this requirement, stating:

"One provision of the bill, however, causes me serious concern, and I request its deletion. The Secretary of the Interior, in administering the program is required, in effect, to obtain the approval of the committees of the House and Senate for each water research grant or contract. Although this legislation is so phrased that it is not technically subject to constitutional objection, it violates the spirit of the constitutional requirement of separation of power between the executive and legislative branches. It is both inappropriate and inefficient for committees of the Congress to participate in the award of individual contracts or grants. Apart from the question of the relationship between the executive and legislative branches, the delays which would ensue from the suggested procedure would be detrimental to both scientific research and the timely achievement of the important mission of the legislation."

These bills would carry out the President's request.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

KENNETH HOLUM,
Assistant Secretary of the Interior.

CHANGES IN EXISTING LAW

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

ACT OF JULY 17, 1964 (78 STAT. 331)

That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH
INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts" or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, both, in relation to water resources and to provide for the training of

scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments,

and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and monies appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

【The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.】

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. 【There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions; with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to

the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.】 (a) *There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State and Federal government agencies, to undertake research into any aspects or water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.*

(b) *No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die.*

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when,

in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this section shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 306. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

SEC. 307. *The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor.*

89TH CONGRESS
2D SESSION

H. R. 3606

[Report No. 1350]

IN THE HOUSE OF REPRESENTATIVES

JANUARY 26, 1965

Mr. O'BRIEN introduced the following bill; which was referred to the Committee on Interior and Insular Affairs

MARCH 26, 1966

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in italic]

A BILL

To promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That ~~(a) Section 200 of Public Law 88-379 of the Eighty-~~
4 ~~eighth Congress is repealed; and~~

5 ~~(b) That there is enacted in lieu thereof the following:~~

6 “SEC. 200. There is authorized to be appropriated to the
7 Secretary of the Interior \$5,000,000 in fiscal year 1966;
8 increasing \$1,000,000 annually for five years, and continuing
9 at \$10,000,000 annually thereafter from which he may make
10 grants, contracts, matching, or other arrangements with

1 educational institutions, private foundations, or other institu-
2 tions; with private firms and individuals; and with local,
3 State, or Federal Government agencies, to undertake re-
4 search into any aspects of water problems related to the
5 mission of the Department of the Interior, which may be
6 deemed desirable and are not otherwise being studied."

7 *That section 200 of the Water Resources Research Act of*
8 *1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to*
9 *read as follows:*

10 "SEC. 200. (a) *There are authorized to be appropriated*
11 *to the Secretary of the Interior \$5,000,000 for the fiscal year*
12 *1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for*
13 *the fiscal year 1969, \$8,000,000 for the fiscal year 1970,*
14 *\$9,000,000 for the fiscal year 1971, and \$10,000,000*
15 *for each of the fiscal years 1972-1976, inclusive, from*
16 *which appropriations the Secretary may make grants to and*
17 *finance contracts and matching or other arrangements with*
18 *educational institutions, private foundations or other institu-*
19 *tions, with private firms and individuals whose training, ex-*
20 *perience, and qualifications are, in his judgment, adequate*
21 *for the conduct of water research projects, and with local,*
22 *State, and Federal Government agencies, to undertake re-*
23 *search into any aspects of water problems related to the mis-*
24 *sion of the Department of the Interior which he may deem*
25 *desirable and which are not otherwise being studied.*

26 "(b) *No grant shall be made, no contract shall be*

1 *executed, and no matching or other arrangement shall be*
2 *entered into under subsection (a) of this section prior to*
3 *sixty calendar days from the date the same is submitted to*
4 *the President of the Senate and the Speaker of the House*
5 *of Representatives and said sixty calendar days shall not*
6 *include days on which either the Senate or the House of*
7 *Representatives is not in session because of an adjournment*
8 *of more than three calendar days to a day certain or an ad-*
9 *jourment sine die."*

10 *SEC. 2. The last paragraph of section 104 of said Act is*
11 *hereby repealed and a new section 307 is added to that Act*
12 *reading as follows:*

13 *"SEC. 307. The Secretary shall make a report to the*
14 *President and Congress on or before March 1 of each year*
15 *showing the disposition during the preceding calendar year*
16 *of moneys appropriated to carry out this Act, the results*
17 *expected to be accomplished through projects financed during*
18 *that year under sections 101 and 200 of this Act, and the*
19 *conclusions reached in or other results achieved by those*
20 *projects which were completed during that year. The report*
21 *shall also include an account of the work of all institutes*
22 *financed under section 100 of this Act and indicate whether*
23 *any portion of an allotment to any State was withheld and,*
24 *if so, the reasons therefor."*

89TH CONGRESS
2D SESSION

H. R. 3606

[Report No. 1350]

A BILL

To promote a more adequate national program
of water research.

By Mr. O'BRIEN

JANUARY 26, 1965

Referred to the Committee on Interior and Insular
Affairs

MARCH 26, 1966

Reported with an amendment, committed to the Com-
mittee of the Whole House on the State of the
Union, and ordered to be printed

DIGEST of Congressional Proceedings

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE
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(FOR INFORMATION ONLY;
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Issued March 30, 1966
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89th-2nd; No. 54

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HIGHLIGHTS: see page 7

* HOUSE

1. LABOR STANDARDS. The Education and Labor Committee reported with amendment H. R. 13712, to amend the Fair Labor Standards Act of 1938 to extend its protection to additional employees and to raise the minimum wage (H. Rept. 1366) (p. 6777). The bill extends the minimum-wage and overtime provisions to agricultural, logging, and Federal employees, among others. The minimum wage for agricultural employees would begin at \$1 per hour effective Feb. 1, 1967, and gradually increase to \$1.30 effective Feb. 1, 1969. Rep. Dent inserted a summary of the bill (pp. 6770-2).

2. RECLAMATION. The Rules Committee reported a resolution for consideration of H. R. 707, to authorize Interior to construct, operate, and maintain the Tualatin Federal reclamation project, Oreg., and H. R. 2829, to authorize Interior to construct, operate, and maintain the Manson Unit, Chelan division, Chief Joseph Dam project, Wash. p. 6777
3. WATER RESEARCH. The Rules Committee reported a resolution for consideration of H. R. 3606, to promote a more adequate national program of water research. p. 6777
4. SMALL BUSINESS. The Rules Committee reported a resolution for consideration of S. 2729, to increase the ceiling on the Small Business Administration revolving fund. p. 6777
5. WATERSHED. The Agriculture Committee approved the work plan for the Monroe-Annabella, Utah, watershed project. p. 6707
6. SECOND SUPPLEMENTAL APPROPRIATION BILL, 1966. By a vote of 269 to 122, passed as reported this bill, H. R. 14012 (pp. 6708-69). The bill includes funds for this Department as follows: (1) Appropriations for pay costs pursuant to Public Law 89-301 and wage board increases, \$15,841,000 and a transfer of \$64,000, and (2) supplemental appropriations for the Forest Service for fighting forest fires, \$7,500,000. For details of the amounts requested see Digests 29, 30, and 41.
7. EXPORT CONTROLS. Rep. Curtis stated that the Export Control Act, "under which controls had on March 7 been imposed on exports of U. S. hides and other leathers, does not contain proper consultative procedures", and inserted two letters on the subject. pp. 6774-5
8. INFLATION. Rep. Curtis inserted an article, "...Administration Effort to Curb Wages and Prices Seen Facing Difficulties." pp. 6775-6
9. ANIMAL RESEARCH. Rep. Bolton urged support of her bill, H. R. 13346, to authorize this Department to regulate the handling of experimental animals, listed the "weaknesses" of a similar bill reported by the Agriculture Committee, and inserted an article, "Weak Pet Bill." p. 6776
10. FOREIGN AID. Reps. Albert and Boggs commended the President's proposal to establish an Indian-American Foundation "to be financed by \$300 million worth of Indian currencies held by the United States through the sale of surplus agricultural products." pp. 6769, 6769-70
11. LEGISLATIVE PROGRAM. The "Daily Digest" states that on Wed. the House will consider the water research bill. p. D262

CONSIDERATION OF H.R. 3606

MARCH 29, 1966.—Referred to the House Calendar and ordered to be printed

Mr. DELANEY, from the Committee on Rules, submitted the following

R E P O R T

[To accompany H. Res. 801]

The Committee on Rules, having had under consideration House Resolution 801, report the same to the House with the recommendation that the resolution do pass.

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1 mittee on Interior and Insular Affairs now in the bill and
2 such substitute for the purpose of amendment shall be con-
3 sidered under the five-minute rule as an original bill. At the
4 conclusion of such consideration the Committee shall rise and
5 report the bill to the House with such amendments as may
6 have been adopted, and any Member may demand a separate
7 vote in the House on any of the amendments adopted in the
8 Committee of the Whole to the bill or committee substitute.
9 The previous question shall be considered as ordered on the
10 bill and amendments thereto to final passage without inter-
11 vening motion except one motion to recommit with or with-
12 out instructions. After the passage of H.R. 3606, the Com-
13 mittee on Interior and Insular Affairs shall be discharged
14 from the further consideration of the bill (S. 22), and it shall
15 then be in order in the House to move to strike out all after
16 the enacting clause of said Senate bill and insert in lieu
17 thereof the provisions contained in H.R. 3606 as passed.

89TH CONGRESS
2^D SESSION

H. RES. 801

[Report No. 1380]

RESOLUTION

Providing for consideration of H.R. 3606, a bill
to promote a more adequate national pro-
gram of water research.

By Mr. DELANEY

MARCH 29, 1966

Referred to the House Calendar and ordered to be
printed

House March 30, 1966

nations which have either the food to offer or the means to buy food. Proposed that we allot up to 200,000 tons of corn, up to 150 million pounds of vegetable oils, and up to 125 million pounds of milk powder to India. Proposed the allotment of 325,000 to 700,000 bales of cotton and 2 to 4 million pounds of tobacco so that India could release its own exchange resources for food and fertilizer purchases. Stated that he has directed the Secretary of Agriculture, in cooperation with AID, to consult with the Indian Government to ascertain if there are ways and means by which we can strengthen this effort. Proposed the establishment of an Indo-U. S. Foundation to stimulate education and scientific research in India, particularly in the field of agriculture and agricultural development. Urged endorsement of the Congress for this program. To Agriculture Committee. (H. Doc. 417) (pp. 6787-9) Rep. Albert and others commended the President's message (pp. 6809-11, 6827, 6859-60).

15. WATER RESEARCH. Passed with amendment S. 22, to authorize the appropriation of \$85 million over a ten-year period to the Secretary of the Interior to make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals, and with local, State, and Federal agencies, to undertake research into any aspects of water problems related to the mission of the Interior Department, after substituting the language of a similar bill, H. R. 3606, which had been passed earlier as reported. H. R. 3606 was tabled. pp. 6801-2, 6806-9

16. DEFENSE PRODUCTION. The Banking and Currency Committee voted to report (but did not actually report) "H. R. 14025 (amended), to renew the Defense Production Act." p. D271

17. DAYLIGHT SAVING TIME. By a vote of 281 to 91, agreed to the conference report on S. 1404, the proposed Uniform Time Act of 1966, to establish uniform dates (from the last Sunday of Apr. to the last Sunday of Oct. each year) for the commencing and ending of daylight saving time in all States and jurisdictions where it is observed (pp. 6783-4). This bill will now be sent to the President.

18. RECLAMATION. Passed with amendment S. 254, to authorize the Secretary of the Interior to construct the Tualatin reclamation project, Ore., after substituting the language of a similar bill, H. R. 707, which has been passed earlier as reported. H. R. 707 was tabled. The bill includes a provision prohibiting, for ten years, the delivery of water from the project for the production of basic agricultural commodities in surplus supply, unless the Secretary of Agriculture authorizes production in the interest of national security. pp. 6793-4, 6795-6801

Passed with amendment S. 490, to authorize the Secretary of the Interior to construct the Manson unit, Chelan division, Chief Joseph Dam project, Wash., after substituting the language of a similar bill, H. R. 2829, which had been passed earlier as reported. H. R. 2829 was tabled. The bill includes a provision prohibiting, for ten years, the delivery of water from the project for the production of basic agricultural commodities in surplus supply, unless the Secretary of Agriculture authorizes production in the interest of national security. pp. 6794-5, 6802-6

19. PERSONNEL. Passed with an amendment H. R. 5147, to amend the Federal Employees Health Benefits Act of 1959 so as to permit until Dec. 31, 1966, CSC approval

of additional health benefits plans to come within the purview of the Act.
pp. 6789-93

20. INFORMATION. A subcommittee of the Government Operations Committee voted to report to the full committee S. 1160, to clarify and protect the right of the public to information. p. D272
21. FOREIGN AID. The Armed Services Committee voted to report (but did not actually report) H. R. 12617, to amend the Act providing for the economic and social development of the Ryukyu Islands. p. D271
Rep. McDade commended the efforts of the students of the University of Scranton to raise contributions to buy food for the people of India. p. 6782
22. INTERIOR AND RELATED AGENCIES APPROPRIATION BILL, 1967. The Appropriations Committee was granted permission to report this bill by midnight Thurs., Mar. 31. p. 6783
23. CORN. Reps. Arends and Quie criticized USDA sales of corn as having an adverse effect on corn prices and grain elevator operators, and Rep. Quie inserted several items, including his letter to Secretary Freeman, on the matter. pp. 6813-5, 6835-8
24. ELECTRIFICATION. Rep. Teague criticized the expansion of the REA coop program as an encroachment on private utility companies. pp. 6815-6
25. CATTLE HIDES. Reps. Shriver and Culver protested the imposition of export quotas on cattle hides. pp. 6827-8, 6850
26. COMMODITY EXCHANGES; POTATOES. Rep. Hathaway spoke in support of his bill, H. R. 6006, to prohibit trading in Irish potato futures on commodity exchanges pp. 6851-2
27. WATERSHEDS. Rep. Bandstra spoke in support of his resolution, H. J. Res. 994, which he stated "is aimed at removing a limitation on new watershed planning authorizations for fiscal year 1966 imposed by the Bureau of the Budget on U. S. Soil Conservation Service." pp. 6852-3
28. RESEARCH. Rep. Ashbrook urged enactment of legislation to regulate the use of cats and dogs in research experiments, and stated that the House Agriculture Committee "has reported out a bill which is weak and ineffective and cannot help but fail in its objective." pp. 6840-1
29. FOREIGN TRADE. Concurred in the Senate amendments to H. R. 7723, to suspend the duty on certain tropical hardwoods until Jan. 1, 1968. This bill will now be sent to the President. p. 6785
Concurred in the Senate amendments to H. R. 6568, to make permanent the duty-free treatment or lower rates of duty temporarily applicable to copra, palm nuts, and palm-nut kernels, their oils, and specified fatty acids, salts, and other chemical products derived from the oils. This bill will now be sent to the President. pp. 6785-6
Rep. Sisk commended the visit of a Japanese trade mission sent to the Pacific coast to study possibilities of expanding new trade and eliminating or reducing problems of trade relations, particularly with regard to trade in Calif. agricultural products. pp. 6812-3

crop would normally be marketed in excess of the normal supply as defined in section 301(b)(10) of the Agricultural Adjustment Act of 1938, as amended, unless the Secretary of Agriculture calls for an increase in production of such commodity in the interest of national security.

Sec. 6. There is hereby authorized to be appropriated for the construction of the Tualatin project the sum of \$20,900,000 (January 1965 prices) plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in construction costs as indicated by engineering cost indexes applicable to the types of construction involved therein, and, in addition thereto, such sums as may be required to operate and maintain said project."

The SPEAKER. The question is on the motion of the gentleman from Texas [Mr. ROGERS].

The motion was agreed to.

The Senate bill, as amended, was ordered to be read a third time, was read the third time, and passed.

A motion to reconsider was laid on the table.

A similar House bill (H.R. 707) was laid on the table.

A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

Mr. DELANEY. Mr. Speaker, by direction of the Committee on Rules I call up House Resolution 801, and ask for its immediate consideration.

The Clerk read the resolution, as follows:

H. RES. 801

Resolved, That upon the adoption of this resolution it shall be in order to move that the House resolve itself into the Committee of the Whole House on the State of the Union for the consideration of the bill (H.R. 3606) to promote a more adequate national program of water research. After general debate, which shall be confined to the bill and shall continue not to exceed one hour, to be equally divided and controlled by the chairman and ranking minority member of the Committee on Interior and Insular Affairs, the bill shall be read for amendment under the five-minute rule. It shall be in order to consider without the intervention of any point of order the substitute amendment recommended by the Committee on Interior and Insular Affairs now in the bill and such substitute for the purpose of amendment shall be considered under the five-minute rule as an original bill. At the conclusion of such consideration the Committee shall rise and report the bill to the House with such amendments as may have been adopted, and any Member may demand a separate vote in the House on any of the amendments adopted in the Committee of the Whole to the bill or committee substitute. The previous question shall be considered as ordered on the bill and amendments hereto to final passage without intervening motion except one motion to recommend with or without instructions. After the passage of H.R. 3606, the Committee on Interior and Insular Affairs shall be discharged from the further consideration of the bill (S. 22), and it shall then be in order in the House to move to strike out all after the enacting clause of said Senate bill and insert in lieu thereof the provisions contained in H.R. 3606 as passed.

Mr. DELANEY. Mr. Speaker, I yield 30 minutes to the gentleman from Tennessee [Mr. QUILLEN], and pending that I yield myself such time as I may consume.

Mr. DELANEY. Mr. Speaker, House Resolution 801 provides an open rule, waiving points of order, with one hour of general debate for consideration of H.R. 3606, a bill to promote a more adequate national program of water research.

The purpose of the bill would be accomplished by amending the Water Resources Research Act of 1964 to provide basic authority to the Secretary of the Interior for a program of extramural research into all aspects of water problems relating to the mission of the Department of the Interior. Under this program, research grants or contracts could be made on a matching or other basis with State water resources research agencies or other government agencies or with universities or other educational institutions or with private firms or individuals in order to fulfill the requirements of a sound research program. The objective of the program is to bring to bear on our national water problems the talents and research competence of our best trained scientists and the use of the best facilities available wherever they may be located. As amended by the Committee on Interior and Insular Affairs, H.R. 3606 would authorize the appropriation of \$85 million over a 10-year period.

Mr. Speaker, I urge the adoption of House Resolution 801.

Mr. HALL. Mr. Speaker, will the gentleman yield?

Mr. DELANEY. I yield to the gentleman.

Mr. HALL. I appreciate the gentleman yielding again. I have by now a standardized question on these rules that waive points of order. In lines 10 through 12 of the resolution, House Resolution 801, it says:

It shall be in order to consider without the intervention of any point of order the substitute amendment recommended by the Committee on Interior and Insular Affairs.

As to the bill now before us, can the gentleman assure me that the same reason for waiving points of order pertains as in the last two rules that were just discussed?

Mr. DELANEY. The same reason pertains—with one possible exception and that is as to the State matching funds. I will yield to the chairman of the Committee on Interior and Insular Affairs, the gentleman from Colorado [Mr. ASPINALL], for the purpose of answering that question.

Mr. ASPINALL. Mr. Speaker, there is also, as I understand it, a question here of the relationship between the executive and legislative departments. We have placed in the bill a provision for oversight authority for the Committee on Interior and Insular Affairs. The President in 1964 when he signed the parent legislation took exception to title II and has failed to implement it since then because he said that the action we asked for to have the contracts reported back to the Congress and give us in that legislation the power to negate those contracts trespassed upon the authority of the executive department.

So in this bill we are still keeping the oversight and we have made it necessary

to report back to the Congress under subsection (b) of the first section, that is section 200, with this language:

(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die.

Now my position, and I think the position of everybody on our committee, is that this is germane. But if the question of germaneness was raised, it would take quite a bit of time perhaps to thrash it out.

What our committee has tried to do, if I may say to the good colleague from Missouri, is to retain our oversight authority on all of these programs so that we know specifically and in detail what is being carried on because with 1,450 plus contracts in being at any one time, the only way you know what is going on is to have the reports processed up to the committee. We are not doing anything about it except as the chairman of the committee or somebody from the committee where a contract might be made would take exception and would ask to have it held up and my colleague, the gentleman from Missouri, knows that this would be very effective.

Mr. HALL. I certainly thank the gentleman, Mr. Speaker, for his explanation.

If the gentleman from New York will yield further, may I say I have nothing but the greatest admiration for the surveillance and oversight which the gentleman plans to write into the bill.

Last year when the Committee on Armed Services on which I serve attempted to do the same thing under a section on military construction, it was actually vetoed for the same reason because there was a question of the transgression on the authority of the executive branch in the opinion of the President and his counsel and the Attorney General. Of course, the House of Representatives has no counsel of its own. You may recall this came to a final vote on the floor of the House at the insistence of the gentleman from Missouri. There is a question in my mind about waiving these points of order and not permitting the House to work its will when we eliminate all points of order or questions of germaneness in the rule and making the consideration of the bill in order. Such rules, of course, repeatedly come down from the Committee on Rules. That is the problem that is bothering me. I will say, Mr. Speaker, if the gentleman will yield further, it bothers me not just as an individual but as a member of the Joint Committee with the other body on the reorganization of the Congress. We have this under very active consideration at this particular time including the rules of germaneness in this body. Of course, there is no such rule of germaneness in the other body, as my colleague, the gentleman from Colorado, and the gentle-

man from New York, well know. It is for this reason that I am building up this dossier on waiving points of order in the rules that make otherwise perfectly good bills, with perfectly good intent, in order.

In doing this, may I say I am in full sympathy with what the committee and the distinguished chairman of the committee have in mind. I am seriously concerned about not being able as one elected Member of the people's personal Representatives in this House to make a point of order, whether the bill be for a good purpose, as in this instance perhaps—or for a bad purpose—when these rules are brought to us waiving such points of order. I take it in view of the explanation of the chairman of the Committee on Interior and Insular Affairs that he himself did ask for the waiver of all points of order in this rule?

Mr. ASPINALL. That is correct.

Mr. DELANEY. I can assure the gentleman that the Committee on Rules does not take lightly any request for waivers of points of order. Such requests are discussed at great length as this request was and we were satisfied with the explanation of the chairman of the Committee on Interior and Insular Affairs who explained it to the satisfaction of the Committee on Rules. Each time a request is made for a waiver of points of order, it causes quite a discussion and the committee is not inclined to grant waivers of points of order except where it is deemed proper after an explanation.

Mr. HALL. I appreciate that statement and I hope they are even more strict in the future about not granting such requests for waivers of points of order. There has been evidence here today about a rule coming out where all matters were not even present, although the chairman, the gentleman did not bring that out—the gentleman in the well did not bring that out. There has been some other evidence in this session of the Congress wherein waivers were apparently granted which were not requested either by the committee or the chairman—which is quite beside the point I know.

Mr. DELANEY. I know of no such waiver. I do not think the Committee on Rules has ever assumed during the years that I have been a member of the committee, the right to waive points of order unless that was requested by the chairman who presented the bill.

Mr. HALL. If the gentleman would be good enough to see me later, I will be glad to document my statement.

Mr. DELANEY. I will be glad to see the gentleman.

Mr. GROSS. Mr. Speaker, will the gentleman yield?

Mr. DELANEY. I yield to my friend, the gentleman from Iowa.

Mr. GROSS. I appreciate it. Thank you, sir. If the gentleman will look back over the record, he will see that it was only a month or two ago, as I remember, in this session of the Congress that points of order in at least one, and perhaps two instances, were waived without the request of the chairman of the committee. I happen to serve on one of the committees from which no request of waiver of points of order was made.

Mr. DELANEY. I do not know of a single instance.

Mr. GROSS. There is on record one, and perhaps two.

Mr. DELANEY. It is possible that it might have happened, but I know of no instance.

Mr. GROSS. I do not want to engage in a discussion of semantics with my friend from New York, but I question that when he says the rule is an open rule waiving points of order that that is exactly correct. It seems to me that waiving points of order infringes upon the open rule.

Mr. DELANEY. A point of order may be made and the section to which it applies could be thrown out. But it would give you the right under an open rule to amend any part of the bill.

Mr. GROSS. I question whether it is a fully open rule when points of order are waived.

Mr. DELANEY. That is a matter of opinion.

Mr. Speaker, I reserve the balance of my time.

(Mr. QUILLEN asked and was given permission to revise and extend his remarks.)

Mr. QUILLEN. Mr. Speaker, I yield myself as much time as I may consume.

Mr. Speaker, House Resolution 801 provides a rule, waiving points of order, with 1 hour of general debate for the consideration of H.R. 3606.

The purpose of H.R. 3606 is to improve current research programs in the field of water resources by amendment the Water Resources Research Act of 1964 to provide authority for the Secretary of the Interior to undertake a program of research into all aspects of water problems under the control of the Department.

Under H.R. 3606, research grants and contracts on a matching or other basis are provided for State agencies, universities, firms, and individuals working in the field. The bill authorizes \$85 million over a 10-year period.

The principle language of the bill was included in title II of the Water Resources Research Act. Additionally, only \$1 million was authorized for each year of a 10-year period, and either Interior Committee could bar appropriations to fund projects. The President objected to this and no requests for funds under title II have been made.

The need for research into our water resources is evident in the testimony it received, according to the Committee on Interior and Insular Affairs. It has therefore determined to alter its previous position. The language approved here is much the same as was approved by House conferees in the 88th Congress during the passage of the act.

The \$85 million authorized for 10 years—through fiscal 1976—is broken down as follows: fiscal 1967, \$5 million; \$6 million in 1968; \$7 million in 1969; \$8 million in 1970; \$9 million in 1971; and \$10 million in 1972–76 inclusive.

There are two other major changes of the act contained in the bill: First, no contract or other agreement may be entered into until 60 days after it has been submitted to Congress during which Congress is in session; second, a broaden-

ing of the reporting requirement. Presently only an annual report is required. The bill requires a report by March 1 to the President and the Congress, giving a complete accounting of funds appropriated during the preceding year and a report on the results expected and conclusions reached in projects funded and underway.

There is a question that the language in Section 307 might not be germane, and waiving the points of order would make it in order.

There are no minority views in the report.

Mr. Speaker, there is no objection that a rule be granted. Reserving the balance of my time, I have no further requests for time.

Mr. DELANEY. Mr. Speaker, I move the previous question.

The previous question was ordered.

The SPEAKER pro tempore. The question is on agreeing to the resolution. The resolution was agreed to.

A motion to reconsider was laid upon the table.

MANSON UNIT, CHIEF JOSEPH DAM PROJECT, WASHINGTON

Mr. ROGERS of Texas. Mr. Speaker, I move that the House resolve itself into the Committee of the Whole House on the State of the Union for the consideration of the bill (H.R. 2829) to authorize the Secretary of the Interior to construct, operate, and maintain the Manson unit, Chelan division, Chief Joseph Dam project, Washington, and for other purposes.

The SPEAKER pro tempore. The question is on the motion offered by the gentleman from Texas.

The motion was agreed to.

IN COMMITTEE OF THE WHOLE

Accordingly, the House resolved itself into the Committee of the Whole House on the State of the Union for the consideration of the bill H.R. 2829, with Mr. Brooks in the chair.

The Clerk read the title of the bill.

By unanimous consent, the first reading of the bill was dispensed with.

The CHAIRMAN. Under the rule, the gentleman from Texas [Mr. ROGERS] will be recognized for 30 minutes; the gentleman from California [Mr. HOSMER] will be recognized for 30 minutes.

The Chair recognizes the gentleman from Texas.

Mr. ROGERS of Texas. Mr. Chairman, I yield to the distinguished gentleman from Colorado [Mr. ASPINALL] such time as he may desire.

(Mr. ASPINALL asked and was given permission to revise and extend his remarks.)

[Mr. ASPINALL addressed the Committee. His remarks will appear hereafter in the Appendix.]

Mr. HOSMER. Mr. Chairman, I yield myself such time as I may consume.

(Mr. HOSMER asked and was given permission to revise and extend his remarks.)

Mr. HOSMER. Mr. Chairman, as indicated by the distinguished Chairman of the full Committee on Interior and

SEC. 2. Irrigation repayment contracts shall provide for repayment of the obligation assumed thereunder with respect to any contract unit over a period of not more than fifty years exclusive of any development period authorized by law. Construction costs allocated to irrigation beyond the ability of the irrigators to repay during the repayment period shall be returned to the Reclamation Fund from revenues derived by the Secretary from the disposition of power marketed through the Chief Joseph Dam project. The term "construction costs", as used herein, shall include any irrigation operation, maintenance, and replacement costs during the development period which the Secretary finds it proper to fund because they are beyond the ability of the irrigators to pay during that period. Power and energy required for irrigation water pumping for the Manson unit shall be made available by the Secretary from the Federal Columbia River power system at charges determined by the Secretary.

SEC. 3. The Secretary is authorized, as a part of the Manson unit, to construct, operate, and maintain or otherwise provide for basic public outdoor recreation facilities; to acquire or otherwise to include within the unit area such adjacent lands or interests therein as are necessary for present or future public recreation use, to assign water and reservoir capacity to recreation and to provide for public use and enjoyment of unit lands, facilities, and water areas in a manner coordinated with the other project purposes. The Secretary shall transfer lands acquired for the unit within exterior national forest boundaries to the Secretary of Agriculture for administration as national forest, and jurisdiction of national forest lands within the unit shall remain with the Secretary of Agriculture for recreation and other national forest system purposes: *Provided*, That the lands and waters within the flow lines of any reservoir or otherwise needed or used for the operation of the project for other purposes shall continue to be administered by the Secretary of the Interior to the extent he determines to be necessary for such operation. The costs of the undertakings described in this section, including costs of investigation, planning, Federal operation and maintenance, and an appropriate share of joint costs of the unit, shall be nonreimbursable.

SEC. 4. Costs of means and measures to prevent loss of and damage to fish and wildlife resources shall be considered as project costs and allocated as may be appropriate among other project functions.

SEC. 5. For a period of ten years from the date of enactment of this Act, no water shall be delivered to any water user on the Manson unit, Chelan division, for the production on newly irrigated lands of any basic agricultural commodity, as defined in the Agricultural Act of 1949, or any amendment thereof, if the total supply of such commodity for the marketing year in which the bulk of the crop would normally be marketed is in excess of the normal supply as defined in section 301(b)(10) of the Agricultural Adjustment Act of 1938, as amended, unless the Secretary of Agriculture calls for an increase in production of such commodity in the interest of national security.

SEC. 6. There are hereby authorized to be appropriated for construction of the new works involved in the Manson unit, \$12,400,000 (October 1959 prices), plus or minus such amounts, if any, as may be required by reason of changes in the cost of construction work of the types involved therein as shown by engineering cost indexes and, in addition thereto, such sums as may be required to operate and maintain said unit.

The CHAIRMAN. The Clerk will report the first committee amendment.
The Clerk read as follows:

Page 2, line 16, strike out "Reclamation Fund" and insert "reclamation fund within said repayment period".

The committee amendment was agreed to.

The CHAIRMAN. The Clerk will report the next committee amendment.

The Clerk read as follows:

Page 2, line 119, strike out "Chief Joseph Dam project." and insert "Bonneville Power Administration."

The committee amendment was agreed to.

The CHAIRMAN. The Clerk will report the next committee amendment.

The Clerk read as follows:

Page 3, line 4, through page 4, line 6, strike out all of sections 3 and 4 and insert the following language in lieu thereof:

"SEC. 3. The conservation and development of the fish and wildlife resources and the enhancement of recreation opportunities in connection with the Manson unit shall be in accordance with the provisions of the Federal Water Projects Recreation Act (79 Stat. 213)."

AMENDMENT OFFERED BY MR. ASPINALL

Mr. ASPINALL. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. ASPINALL to the committee amendment on page 4, line 10: Strike out the word "Projects" and insert in lieu thereof the word "Project".

The amendment to the committee amendment was agreed to.

The committee amendment, as amended, was agreed to.

The CHAIRMAN. The Clerk will report the next committee amendment.

The Clerk read as follows:

Page 4, line 12, strike out "Sec. 5." and insert "Sec. 4."

The committee amendment was agreed to.

The CHAIRMAN. The Clerk will report the next committee amendment.

The Clerk read as follows:

Committee amendment: Page 4, line 24, strike out "Sec. 6." and insert "Sec. 5."

The committee amendment was agreed to.

The CHAIRMAN. The Clerk will report the next committee amendment.

The Clerk read as follows:

Committee amendment: Page 5, line 1, strike out "\$12,400,000 (October 1959 prices)," and insert "\$13,344,000 (April 1965 prices)."

The committee amendment was agreed to.

The CHAIRMAN. Under the rule, the Committee rises.

Accordingly, the Committee rose; and the Speaker having resumed the chair, Mr. Brooks, Chairman of the Committee of the Whole House on the State of the Union, reported that that Committee having had under consideration the bill (H.R. 2829) to authorize the Secretary of the Interior to construct, operate, and maintain the Manson unit, Chelan division, Chief Joseph Dam project, Washington, and for other purposes, pursuant to House Resolution 800, he reported the bill back to the House with sundry amendments adopted by the Committee of the Whole.

The SPEAKER. Under the rule, the previous question is ordered.

Is a separate vote demanded on any amendment? If not, the Chair will put them en gros.

The amendments were agreed to.

The SPEAKER. The question is on the engrossment and third reading of the bill.

The bill was ordered to be engrossed and read a third time and was read the third time.

The SPEAKER. The question is on passage of the bill.

The bill was passed.

A motion to reconsider was laid on the table.

The SPEAKER. Pursuant to the provisions of House Resolution 800, the Committee on Interior and Insular Affairs is discharged from the further consideration of the bill S. 490.

The Clerk read the title of the Senate bill.

MOTION OFFERED BY MR. ROGERS OF TEXAS

Mr. ROGERS of Texas. Mr. Speaker, I offer a motion.

The Clerk read as follows:

Motion offered by Mr. ROGERS of Texas: Strike out all after the enacting clause of S. 490 and insert in lieu thereof the provisions of H.R. 2829 as passed, as follows:

"That, for the purposes of supplying irrigation water approximately five thousand eight hundred acres of land, undertaking the rehabilitation and betterment of works serving a major portion of these lands, conservation and development of fish and wildlife resources, and enhancement of recreation opportunities, the Secretary of the Interior is authorized to construct, operate, and maintain the Manson unit, Chelan division, Chief Joseph Dam project, Washington, in accordance with the Federal reclamation laws (Act of June 17, 1902, 32 Stat. 388, and Acts amendatory thereof or supplementary thereto). The principal works of the unit shall consist of dams and related works for enlargement of Antillon Lake storage, related canals, conduits, and distribution systems, and works incidental to the rehabilitation of the existing irrigation system.

"SEC. 2. Irrigation repayment contracts shall provide for repayment of the obligation assumed thereunder with respect to any contract unit over a period of not more than fifty years exclusive of any development period authorized by laws. Construction costs allocated to irrigation beyond the ability of the irrigators to repay during the repayment period shall be returned to the reclamation fund within said repayment period from revenues derived by the Secretary from the disposition of power marketed through the Bonneville Power Administration. The term "construction costs", as used herein, shall include any irrigation operation, maintenance, and replacement costs during the development period which the Secretary finds it proper to fund because they are beyond the ability of the irrigators to pay during that period. Power and energy required for irrigation water pumping for the Manson unit shall be made available by the Secretary from the Federal Columbia River power system at charges determined by the Secretary.

"SEC. 3. The conservation and development of the fish and wildlife resources and the enhancement of recreation opportunities in connection with the Manson unit shall be in accordance with provisions of the Federal Water Project Recreation Act (79 Stat. 213).

"SEC. 4. For a period of ten years from the date of enactment of this Act, no water shall be delivered to any water user on the Man-

son unit, Chelan division, for the production on newly irrigated lands of any basic agricultural commodity, as defined in the Agricultural Act of 1949, or any amendment thereof, if the total supply of such commodity for the marketing year in which the bulk of the crop would normally be marketed is in excess of the normal supply as defined in section 301(b)(10) of the Agricultural Adjustment Act of 1938, as amended, unless the Secretary of Agriculture calls for an increase in production of such commodity in the interest of national security.

"SEC. 5. There are hereby authorized to be appropriated for construction of the new works involved in the Manson unit \$13,344,000 (April 1965 prices), plus or minus such amounts, if any, as may be required by reason of changes in the cost of construction work of the types involved therein as shown by engineering cost indexes and, in addition thereto, such sums as may be required to operate and maintain said unit."

The motion was agreed to.

Then Senate bill, as amended, was ordered to be read a third time, was read the third time, and passed.

A motion to reconsider was laid on the table.

A similar House bill was laid on the table.

GENERAL LEAVE TO EXTEND

Mr. ROGERS of Texas. Mr. Speaker, I ask unanimous consent that all Members who desire to do so may extend their remarks at the appropriate place on H.R. 2829 and the bill H.R. 707, which the House passed just previous to that.

The SPEAKER. Is there objection to the request of the gentleman from Texas? The Chair hears none, and it is so ordered.

There was no objection.

PROMOTING A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

Mr. ROGERS of Texas. Mr. Speaker, I move that the House resolve itself into the Committee of the Whole House on the State of the Union for the consideration of the bill (H.R. 3606) to promote a more adequate national program of water research.

The SPEAKER. The question is on the motion offered by the gentleman from Texas.

The motion was agreed to.

IN COMMITTEE OF THE WHOLE

Accordingly, the House resolved itself into the Committee of the Whole House on the State of the Union for the consideration of the bill H.R. 3606, with Mr. BROOKS in the chair.

The Clerk read the title of the bill.

By unanimous consent, the first reading of the bill was dispensed with.

The CHAIRMAN. Under the rule, the gentleman from Texas [Mr. ROGERS], will be recognized for 30 minutes; the gentleman from California [Mr. HOSMER], will be recognized for 30 minutes.

At this time the Chair recognizes the gentleman from Texas.

Mr. ROGERS of Texas. Mr. Chairman, I yield such time as he may desire to the distinguished gentleman from Colorado [Mr. ASPINALL].

(Mr. ASPINALL asked and was given permission to revise and extend his remarks.)

[Mr. ASPINALL addressed the Committee. His remarks will appear hereafter in the Appendix.]

Mr. HOSMER. Mr. Chairman, I yield myself such time as I may consume.

(Mr. HOSMER asked and was given permission to revise and extend his remarks.)

Mr. HOSMER. Mr. Chairman, this is a bill for research. Now, today, being against research is about like being for sin. This is good, simply because the more knowledge we have the better off this country will be in every way.

Mr. Chairman, I am happy to join in the support of this bill which proposes research on such an important matter as water which is basic to our national life.

Now, Mr. Chairman, H.R. 3606 provides for the expenditure of some \$85 million on an escalating scale during the first 5 years. Some \$35 million during the first 5 years, starting out at \$5 million a year, and \$50 million during the last 5 years at a rate of \$10 million a year.

An authorization this far into the future—and, incidentally, this takes us to the 1st session of the 94th Congress—might be questionable because over that period of years the operations of the program could conceivably get far out of hand, and conceivably involve the wastage of a good deal of Federal sums that might be involved.

However, Mr. Chairman, I do not worry about that simply because—and I want to get this on the RECORD—of the work and the responsible attitude taken toward this and every other measure which comes before the Committee on Interior and Insular Affairs that calls for expenditure of Federal funds, by its chairman, the gentleman from Colorado [Mr. ASPINALL] and by the chairman of its Subcommittee on Irrigation and Reclamation, the gentleman from Texas [Mr. ROGERS].

These gentlemen and other members of this important committee have, during all of the years of their service on this committee, nailed down tighter and tighter control over the expenditure of money that is authorized and voted by the Congress. That is all to the good.

This has not been an easy task. There are constitutional questions as to the line of authority between the legislative and executive branch.

The gentlemen whom I have mentioned have worked to hew as closely to that line as possible insofar as the constitutional prerogatives and duties of the Congress are concerned. They have done the difficult job at times of devising language that will accomplish that purpose and I am satisfied that because of this work and because of that zeal and because of this dedication, we do have a measure here which insofar as it is constitutionally possible by legislative oversight to guarantee the wise expenditure of money which may be appropriated in the years ahead, does so guarantee it.

H.R. 3606 provides authority to the Secretary of the Interior to enter into contracts and other arrangements for

research on water problems related to the mission of the Department of the Interior. These research grants or contracts could be made on a matching basis or under some other arrangement with educational institutions or private foundations, private firms or with individuals. Water research under this program could also be conducted by Federal and State agencies. This program is designed to bring to bear on our national water problems the best scientific talent and research competence available whether it be in educational institutions or in private firms or in Federal agencies.

The program authorized by this act is an extension of the water resources research program we authorized in 1964 by the enactment of Public Law 88-379, the Water Resources Research Act of 1964. Under the 1964 act, Water Resources Research Institutes have been established in each State and that program is off to a good start.

During the hearings, the committee was advised that cooperative arrangements for conducting the research work of the research institutes in each State have been carried as far as possible under the limited funds available for the present program. However, there are still many strong and competent universities not in the program and with no prospect of being in the program unless the legislation we have under consideration today is enacted. Thus, the present program is not tapping the total research talent and competence of our universities.

For example, in my own State of California there are nine separate campuses in the University of California system not to mention Stanford, the University of Southern California, and the California Institute of Technology, all of which have research and training competence in the water field. There is no possibility of taking advantage of this talent under the present program because of the limited funds available and the excessive fragmentation of the one institute's allotment that would result.

In addition to the research talent and competence available in our universities, there are numerous nonprofit and private organizations which through years of experience have developed competence in certain specific areas in the broad research field of water resources.

Mr. Chairman, the committee received excellent testimony this year demonstrating the need for this expanded program to assist this Nation in resolving the many and ever-increasing water problems. Based on this demonstrated need, the committee is recommending enactment of this legislation. However, the committee intends to retain control of what is being done under this legislation.

Two years ago a limited program similar to the one that H.R. 3606 would authorize was included in the Water Resources Research Act of 1964. The President objected to language which Congress attached to that authority because it permitted the authorizing committees of the Congress to bar appropriations to fund water research projects.

The language which the committee has placed in this bill does not permit the

committees to veto the projects but it does require that all research contracts and proposals be submitted to the authorizing committees 60 legislative days prior to their execution. This gives the committee an opportunity to review the proposed research work and advise the Secretary of any objections to the proposed projects.

The committee also amended the bill to limit the life of the program to 10 years beginning in fiscal year 1967. This will provide an opportunity for an overall review of the accomplishments and needs at the end of that period in order to determine whether the program should be extended. One other committee amendment requires a full annual report covering the entire program and a detailed accounting for the appropriated funds.

Mr. Chairman, I believe that H.R. 3606 authorizes a meritorious and much-needed program and that we have amended the legislation so that the program can be kept under control and on the right track. I am happy to join the chairman and other members of the Interior and Insular Affairs Committee in supporting H.R. 3606 and recommending that it be approved by the House.

Mr. ROGERS of Texas. Mr. Chairman, I yield such time as he may desire to the gentleman from Texas [Mr. PICKLE].

Mr. PICKLE. Mr. Chairman, I have asked for this time for the purpose of commending the chairman of the committee, the gentleman from Colorado [Mr. ASPINALL], and the chairman of the subcommittee, the gentleman from Texas [Mr. ROGERS] for the interest they have shown in this measure.

I had introduced a companion bill to H.R. 3606 which companion bill was H.R. 6282, and I have followed the hearings very closely.

I would like to point out to the House, that I think the committee has written language in this measure which not only provides worthwhile research funds but also has eliminated the possibility of duplication and waste as the chairman has said earlier.

When the Water Research Act was passed, I must confess I was somewhat disappointed because title I language was more or less restricted to the land-grant schools and title II funds were very limited.

This prevented a school like the University of Texas, which has a very large and effective water resource research program underway, from being able to contribute its talent and knowledge in this field.

This bill restores these funds and will enable the University as one school to go forth in this field.

I might add that a situation in Texas might be typical of the same situation as would have occurred in other States and that is, that some institutions, public and private, might now be in line for the administration of these funds.

Three schools in Texas, because of the caution that the chairman of this committee and his members have exercised, have finally gotten together and resolved their differences and have joined hands

now in a written agreement to serve as an institute to handle these funds.

This has been a commendable development in our State because now we have Texas Tech and the University of Texas and Texas A. & M. all joining hands to administer the funds.

So I want to express myself as being in favor of this measure and I commend the committee again for the advancement of this bill.

Mr. Chairman, worthwhile research needs adequate financial participation to extend over several years so as to afford adequate opportunity to pursue promising leads. I, therefore, seek support and urge passage of H.R. 3606, a bill that will promote a more adequate national program of water research. I think that the funds made available for research through this bill are necessary to thwart the acute water crisis and supply shortages that are spreading across the Nation. I also believe that the bill is a realistic compromise under present fiscal conditions.

I am pleased that three fine schools in Texas—The University of Texas A. & M. University and Texas Tech—have joined hands to provide a water resource research council within the State. The effects of this measure will be so comprehensive that it will cover nearly every river and watershed in the State of Texas—from the Red River to the gulf coast and from the Sabine to the Rio Grande in far south and west Texas.

Our expanding population is placing greater demands on our natural resources, and it behooves us as a nation to make available the tools to preserve our great natural water wealth.

Mr. MAHON. Mr. Chairman, will the gentleman yield?

Mr. PICKLE. I yield to the gentleman.

Mr. MAHON. The gentleman has made reference to the University of Texas. He, of course, is not excluding other schools in Texas and in other States, which are not land-grant colleges which could be considered under this program. As the gentleman knows, I have a deep interest in Texas Technological College in my own district.

Mr. PICKLE. As the gentleman from Texas knows, now the three schools in Texas have joined and are on an equal basis in an institute to handle these funds. Texas Tech is a great school on the Plains. It is interesting to note in our State that three schools—Texas Tech, the University of Texas, and Texas A. & M.—cut across the high plains area through all the water districts down through the coastal areas, and this is good because every aspect is covered.

Mr. GROSS. Mr. Chairman, will the gentleman yield?

Mr. PICKLE. I yield to the gentleman.

Mr. GROSS. You would let some of the Iowa schools and some of the other schools have a little of this research work; would you not? I just do not want it all divided up between you two Texans over there.

Mr. PICKLE. I am sure the Department of Interior would accommodate the

gentleman and he will get his equal share, I am certain.

Mr. GROSS. I notice the distinguished Speaker of the House of Representatives on the floor. I wonder if the State of Massachusetts might figure on getting in on some of this research work.

Mr. PICKLE. I will let the chairman of the committee express himself on that. But, of course, all 50 States equally will participate as the gentleman from Iowa knows—even Iowa.

Mr. HOSMER. Mr. Chairman, I yield 5 minutes to the gentleman from Missouri [Mr. CURTIS].

(Mr. CURTIS asked and was given permission to speak out of the regular order.)

YESTERDAY'S DEBATE ON INFLATION

Mr. CURTIS. Mr. Chairman, I simply take this time to refer to the debate that occurred yesterday on the appropriation bill as it is reported in the March 29, 1966, RECORD.

As those who were present—and there was a pretty full attendance—know, one of the issues developed was this question of inflation and the seriousness of it. I took the floor of the House after listening to some of the presentation on the part of the majority party particularly the majority leader and the majority whip when it appeared to me quite clearly that they were treating inflation quite lightly. In fact, reference was made to inflation being a Republican cliché. In my remarks which appear on page 6743, I was directing attention to that aspect of the debate. I said among other things that we should get this debate back in context of the seriousness of inflation. Now I read the RECORD and I find, and I have just spoken to the majority leader, his remarks on page 6741. There is a very scholarly—and I want to commend him for it—a very scholarly discussion of inflation and the inflationary pressures that indeed face us.

Had these remarks been made on the floor of the House—and, as he said, the gentleman did not have time to present them—I, of course, would not have made the remarks that I did. I was trying to bring the debate around to a serious discussion of the problems of inflation. I do wish to commend the gentleman and others in the majority party for now making the record quite clear that inflation is far from a Republican cliché and that it is a serious issue which is facing our society.

For years I have suggested that a reform be made as far as the CONGRESSIONAL RECORD is concerned. I think that which is said on the floor of the House during the debate should be in one type and that which is put in the RECORD later—and those matters should be put in, I want to say; I am not arguing against the right to extend one's remarks. I think these considered observations belong in the RECORD—but for those who read the debate the next day, or for those who want to read it in the future, particularly interpreting or setting legislative history, these kinds of remarks not subject to cross-examination or the rebuttal of those who are on the

floor participating in the debate ought to show up in a different kind of type.

I hope that this reform will be adopted. I understand that at one time in the Senate they had a procedure whereby matters which were inserted in the RECORD were printed in one type and that which was actually spoken on the floor and subject to rebuttal appeared in a different type.

Mr. DUNCAN of Oregon. Mr. Chairman, will the gentleman yield?

Mr. CURTIS. I yield to the gentleman from Oregon.

Mr. DUNCAN of Oregon. The gentleman will concede that there were some Members on this side who recognized yesterday the danger of inflation.

Mr. CURTIS. Oh, indeed so, and I am happy to say that the RECORD now shows quite clearly that we all, Republicans, Democrats, and the administration, do recognize that this is a serious situation that faces us. It undoubtedly will be a campaign issue, and it is just a shame, I would say, that the debate was not on that basis.

But, of course, the attempt yesterday by the majority leaders was to minimize inflation. It was on this basis that the majority were able to move forward this bill that had nothing to do with guns and nothing to do, really essentially, with helping the poor. It had to do with programs that could well have been deferred. Had the majority leaders presented inflation the way they did present it as one reads it in the RECORD today, I think the switch of the additional five votes that we lacked in order to cut back on nonessential expenditures might have occurred.

The CHAIRMAN. The Chair recognizes the gentleman from Texas.

(Mr. ROGERS of Texas asked and was given permission to revise and extend his remarks.)

Mr. ROGERS of Texas. Mr. Chairman, I yield myself such time as I may consume.

First, I wish to compliment the chairman of the full Committee on Interior and Insular Affairs and the other members of the committee for the fine work that they have done in cooperating in the solution of one of the most serious problems with which our Nation is faced, and that is the water problem. It is not a problem that is confined to any particular section of the country, although it is more acute at times and in some places. It is more serious in some places generally. But it is a problem that faces all of us.

I think that this bill has been designed to provide a means of implementing a program that we did start earlier, and will make it possible to tap the scientific brains in all segments of the economy of this country, whether in educational areas or in the corporate industrial areas. We are able to go clear across the board in trying to find solutions to these very serious problems, and certainly they are most serious in the West.

The legislation which the Committee on Interior and Insular Affairs brings to the House today is designed to promote a more adequate national program for water research. This purpose would be

accomplished by extending the authority in the Water Resources Research Act of 1964. As Chairman ASPINALL said, this expanded program is an important part of our overall national water resources research effort. H.R. 3606 provides authority to the Secretary of the Interior for a program of research into all aspects of water problems related to the mission of the Department of the Interior.

Research grants or contracts could be made on a matching or other basis with Government agencies or with universities or other educational institutions or with private firms or with individuals. The objective of this program is to bring to bear on our national water problems the talents and research competence of our best trained scientists and the use of the best facilities available wherever they may be located.

As amended by the committee, H.R. 3603 would authorize the appropriation of \$85 million over a 10-year period beginning in fiscal year 1967.

Some of you may recall that the legislation which the committee recommends today authorizes a program which, 2 years ago, we deleted from the legislation enacted as the Water Resources Research Act of 1964. We disapproved it at that time because we favored a more modest beginning for this new program and because testimony at that time failed to show the immediate need for the authority requested.

In conference, 2 years ago, we reached agreement on the token title II program presently in the act, but that program has not been implemented because of language which permits the authorizing committees to bar appropriations for research projects.

The committee is now recommending the full title II program but we have placed in the legislation limitations which we believe are necessary if we are to meet our oversight responsibilities. We have limited the life of the program to 10 years in order to provide an opportunity for an overall review of accomplishments and needs at the end of that period and determine whether the program should be extended.

We have placed a provision in the legislation requiring that all contracts and other arrangements be submitted to the Congress 60 days in advance of execution in order to afford the committee an opportunity to review the research proposals and resolve any questions before the contracts or other arrangements are entered into.

We also have broadened the reporting requirement in the present act so that it covers the entire program and provides a detailed annual accounting of the appropriated funds.

All the testimony which the committee received during the hearings was designed to show that this additional authority under title II was needed if we were to take full advantage of available non-Federal scientific talent and research competence in the water field. This year a very good case was made for this legislation by the excellent testimony we have received.

The committee is now of the opinion

that the title II program is needed and that it will greatly assist in resolving this Nation's ever-growing water problems. Contributing also to the committee's approval is the excellent start which has been made in getting the program authorized 2 years ago off the ground and the leadership exemplified by Dr. Roland R. Renne, Director, Office of Water Resources Research, in administering the program.

We believe that the 2-year delay in approving the title II program has been beneficial. This was brought out in the testimony. The many cooperative arrangements that have been worked out among universities for participating in the research work of the State institutes would not have been possible had the title II program been fully authorized 2 years ago. Also, with the present program having gone through the shake-down period, we have been able to determine more accurately the extent of the scientific talent and research competence which is available and should be called upon but which cannot be utilized under present authority.

Mr. Chairman, after full and complete hearings and extensive study of this legislation, we are recommending that the Water Resources Research Act of 1964 be expanded to include the program authorized in H.R. 3606.

Mr. Chairman, I have no further requests for time.

(Mr. ROGERS of Texas asked and was given permission to revise and extend his remarks.)

The CHAIRMAN. The gentleman from California is recognized.

Mr. HOSMER. Mr. Chairman, I have no further requests for time.

The CHAIRMAN. Pursuant to the rule, the Clerk will now read the substitute committee amendment printed in the reported bill as an original bill for the purpose of amendment.

The Clerk read as follows:

H.R. 3606

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 200 of the Water Resources Research Act of 1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to read as follows:

"SEC. 200. (a) There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience, and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State, and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

"(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives

and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die."

SEC. 2. The last paragraph of section 104 of said Act is hereby repealed and a new section 307 is added to that Act reading as follows:

"SEC. 307. The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor."

Mr. ROGERS of Texas (interrupting the reading). Mr. Chairman, I ask unanimous consent that further reading of the amendment be dispensed with, and that the amendment be considered as read in full and open for amendment at any point.

The CHAIRMAN. Is there objection to the request of the gentleman from Texas?

There was no objection.

The committee amendment was agreed to.

The CHAIRMAN. Under the rule, the Committee rises.

Accordingly, the Committee rose; and the Speaker having resumed the chair, Mr. Brooks, Chairman of the Committee of the Whole House on the State of the Union, reported that that Committee having had under consideration the bill (H.R. 3606) to promote a more adequate national program of water research, pursuant to House Resolution 801, he reported the bill back to the House with an amendment adopted by the Committee of the Whole.

The SPEAKER. Under the rule, the previous question is ordered.

The question is on the amendment.

The amendment was agreed to.

The SPEAKER. The question is on engrossment and third reading of the bill.

The bill was ordered to be engrossed and read a third time and was read the third time.

The SPEAKER. The question is on passage of the bill.

The bill was passed.

A motion to reconsider was laid on the table.

The SPEAKER. Pursuant to the provisions of House Resolution 801, the Committee on Interior and Insular Affairs is discharged from the further consideration of the bill S. 22.

MOTION OFFERED BY MR. ROGERS OF TEXAS

Mr. ROGERS of Texas. Mr. Speaker, I offer a motion.

The Clerk read as follows:

Motion offered by Mr. ROGERS of Texas: Strike out all after the enacting clause of S. 22, to promote a more adequate national program of water research, and insert in lieu thereof the provisions of the bill H.R. 3606, as passed, as follows:

"That section 200 of the Water Resources Research Act of 1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to read as follows:

"SEC. 200. (a) There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience, and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State, and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

"(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die."

"SEC. 2. The last paragraph of section 104 of said Act is hereby repealed and a new section 307 is added to that Act reading as follows:

"SEC. 307. The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor."

The SPEAKER. The question is on the motion of the gentleman from Texas [Mr. ROGERS].

The motion was agreed to.

The bill was ordered to be read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

A similar House bill (H.R. 3606) was laid on the table.

GENERAL LEAVE TO EXTEND

Mr. ROGERS of Texas. Mr. Speaker, I ask unanimous consent that all Members may have 5 legislative days in which to extend their remarks on the bill just passed, H.R. 3606.

The SPEAKER. Is there objection to the request of the gentleman from Texas?

There was no objection.

CORRECTION OF THE RECORD

Mr. ALBERT. Mr. Speaker, I ask unanimous consent to correct the Record of yesterday, March 29, 1966, at page 6739, the third column of the page, in the

last sentence of the last complete paragraph, which reads:

That was 44 years ago, making 84 years in all,

The sentence should read:

That was 54 years ago, making 94 years in all,

The SPEAKER. Without objection, it is so ordered.

There was no objection.

PRESIDENT'S MESSAGE ON FOOD FOR INDIA

(Mr. ALBERT asked and was given permission to extend his remarks at this point in the RECORD).

Mr. ALBERT. Mr. Speaker, the President has forwarded for our consideration a message of great urgency and historic significance. His eloquent message combines humanitarian motives with very realistic and very practical considerations.

I do not think we can emphasize too greatly the humanitarian aspects of this message. But it is about the more earthy and practical considerations which I speak now.

First: the national interest of the United States is clearly involved here. In Asia, where democracy has only a tenuous foothold, India can boast a deep commitment to free institutions. We cannot allow the light of this beacon to falter.

More than 500 million people—one-seventh of the population of the world—are Indians. For this number of people and their nation to be shaken by a tragic food crisis would undoubtedly have serious consequences for U.S. foreign policy. The President is not merely giving us an opportunity to throw a lifeline to a neighbor in danger; he is warning us that we must help sustain our friends if we are to save ourselves.

Second. India, perhaps more than any other developing nation, has proven its capacity for self-help. She has proclaimed an agricultural revolution, increasing her agricultural budget by well over 30 percent in recent months. India's leaders, gravely concerned at population growth totaling a million persons a month, have made a major commitment to population control, dispensing family planning information to literally millions of villagers across the subcontinent.

Third. This commitment of resources is one which our wealthy Nation can easily afford. The President proposes to supply wheat and food grains, and fiber with a total market value of \$400 to \$500 million. This is a prudent and realistic commitment; we could go far higher without diminishing our wholly adequate grain and commodity supply at home.

I am deeply impressed with the force and fervor of the President's appeal but I am even more struck by its shrewd and pragmatic approach. It makes good sense.

For that reason, I urge that the Congress give its approval to the pending resolution. By doing so we will demonstrate not only our compassion, not only our solidarity with the President; we will give

historic testimony to our realism and commonsense.

(Mr. BOGGS (at the request of Mr. ALBERT) was granted permission to extend his remarks at this point in the RECORD.)

Mr. BOGGS. Mr. Speaker, President Johnson in a forthright and frank message on the India food situation has laid the case before us.

Last year the rains did not come as expected over large sections of India. Farmers could not plant their crops in the dry soil. Other crops withered and died for lack of water. Indeed, as President Johnson pointed out, not since the dust bowl years of the 1930's here in America has there been a greater agricultural disaster.

This natural disaster is not the fault of the Indian people. In a year in which Indian food production had to rise to meet the needs of India's growing population, the drought could not have come at a worse time.

Unless we act—unless the world acts—to help India over this crisis, the people of India face hunger, deprivation, and hardship.

The President's program of providing 3.5 million tons of food grain and other commodities such as corn, vegetable oil, and milk powder—and asking other nations to contribute generously—deserves our consideration and support.

This is an humanitarian program, in keeping with the finest traditions of our democracy, of sharing our abundance with the needy. We shall not turn our backs. We shall lend a helping hand.

(Mr. POAGE (at the request of Mr. ALBERT) was granted permission to extend his remarks at this point in the RECORD.)

Mr. POAGE. Mr. Speaker, the President has laid before us a stark message of impending tragedy. The drought which has afflicted the Indian subcontinent is of such massive extent that unless India receives, during the present year, several million tons of food from abroad, she will soon be facing the specter of mass starvation.

Leaders of India have appealed for help. The President of the United States has responded with an emergency program to add 3½ million tons of food grain to the 6½ million tons of grain already allotted for shipment to India during this fiscal year. He has asked Congress to endorse these shipments, and I believe that we should do so immediately and overwhelmingly.

India has been making considerable progress in self-help. During the past decade and a half she has increased her food production by 75 percent. She is in the midst of programs to greatly expand production of fertilizer and to introduce modern methods of agriculture. But in the midst of this continuing struggle, she has suffered a natural disaster which is expected to reduce her food grain production from 88 million tons last year to perhaps 75 million tons this year. That is the fatal arithmetic of starvation.

Our Canadian friends have already announced plans to provide at least a million tons of wheat and flour to India.

Other nations will come forward. Every civilized and humane people has a moral obligation to avert this terrible crisis. And that obligation rests heaviest on the people of America who are the wealthiest, most affluent people in all history.

We have never turned our backs to those who are in genuine need. We will not do so now.

The President has full authority to act on these emergency proposals without further congressional action. He could do so under Public Law 480. He has asked us, however, for our concurrence and endorsement. I am sure that this endorsement will be promptly forthcoming from our Agriculture Committee. Let us then by our vote on this floor, tell the people of India and of the world that America's heart is as great as our resources. Let us give a strong and generous response and let India then show her cooperation by pushing the production of food on land now devoted to the production of cotton.

(Mr. MATSUNAGA (at the request of Mr. ALBERT) was granted permission to extend his remarks at this point in the RECORD.)

Mr. MATSUNAGA. Mr. Speaker, President Johnson's message on the India food situation is a remarkable document.

In an hour of need, our great democracy seeks to extend a helping hand to a sister democracy. The President has called upon other nations of the world to join in this great humanitarian effort.

The Congress now has its responsibility. It is to consider the President's proposal carefully. Let us do this. Let us then arise as one body to approve this truly worthwhile program placed before us.

People of India are confronted with an unprecedented drought. This natural disaster is not of their own making. Unless the world responds, India faces famine.

To stem hunger, India estimates that it will need an additional 6 to 7 million tons of food grain through next December—beyond what has already been committed or expected. The President's proposal contemplates the shipment of 3.5 million tons of grain by the United States to help meet this need.

Other nations have been invited to match our contribution. I know that the response throughout the world will be strong and generous. The action of Canada in preparing to provide a million tons of wheat and flour sets an example for other countries and other people to follow.

The Indian Government is moving to help its nation in vigorous and farsighted programs of self-help. Our action in endorsing the program proposed by President Johnson to help tide India over the crisis of the drought will show that we are committed to the cause of free men everywhere.

(Mr. PEPPER (at the request of Mr. ALBERT) was granted permission to extend his remarks at this point in the RECORD.)

Mr. PEPPER. Mr. Speaker, the President has requested congressional endorsement for increased shipments of

agricultural commodities to India during the coming months. I think it noteworthy that the President has communicated this request to the Congress even though he already has authority to take the actions he contemplates under Public Law 480. This is an example of the President's continuing determination to act with the advice and cooperation of the Congress, and he is to be commended for it.

I urge that we endorse the President's emergency program forthwith. Let there be no doubt or question about what is at stake here: either India receives 11 to 12 million tons of imported grain during the present year, or millions of men, women, and children will starve to death on the Indian subcontinent. I do not believe that there is a civilized nation in the world that is prepared to stand by and watch such a calamity occur.

From my brief examination of the President's proposal, I judge that we are asked to send to India food grains of a market value of some \$400 to \$500 million. This is well within our resources. Furthermore, we can make these shipments without dangerously depleting our own agricultural reserves. It is worth noting, also, that India intends to pay for this grain with rupees which we may then turn back to India in the form of loans or other funding to help India move forward more rapidly into an era of modern agriculture.

I think the fact should also be recorded that India's present crisis is not of her own making. Contrary to what some believe, India's agriculture has been improving, year by year, and 80 percent of her effort in this direction has been self-financed.

Premier Gandhi has informed the President, I understand, that India intends to greatly expand its fertilizer program by encouraging more private foreign investment. There is to be a 30-percent increase in India's agricultural budget. Finally, it is the Prime Minister's intention to move forcefully to bring under control India's exploding population.

It is true that much more must be done and done faster and more efficiently. But the great human crisis now approaching India is the result of an unavoidable, natural disaster. India is now in the midst of one of the greatest droughts in human history. The magnitude of her problem can be seen from the fact that last year India produced a bumper crop of 88 million tons of food grains. With her population increasing by almost a million hungry mouths every month, she would have needed still more this year. But because of the terrible drought which has descended upon her, this year's production will be only some 74 to 76 million tons.

Unless the more fortunate peoples of the world now step forward and extend the hand of common humanity, this shortage will very soon be translated into the stark tragedy of starvation.

The President proposes to avert that tragedy. He urges—and intends to continue urging—other nations to do so. I wish to add my own voice to his, and to

April 5, 1966

12. ADJOURNMENT; EASTER RECESS. Agreed to H. Con. Res. 625, providing for adjournment of the House from Apr. 7 to Apr. 18, 1966. p. 7324

SENATE

13. SMALL BUSINESS. Agreed to several House amendments, and disagreed with several House amendments, to S. 2729, to increase by \$125 million the authorization to the Small Business Administration for the amount of loans and commitments that may be outstanding in its regular business loan program, disaster loan program, prime contract authority, and title IV loans under the Economic Opportunity Act. p. 7199
14. WATER RESEARCH. Concurred in a House amendment to S. 22, to authorize appropriation of \$85 million over a 10-year period to the Secretary of the Interior to make grants to, and finance contracts and matching or other arrangements with, educational institutions, private foundations, or other institutions, private firms and individuals, and local, State, and Federal agencies, to undertake research into any aspects of water problems related to the mission of the Interior Department (p. 7252). This bill will now be sent to the President.
Cosponsors were added to S. 3107, to provide for a comprehensive review of national water resource problems and programs. p. 7216
15. FOOD FOR INDIA. The Agriculture and Forestry Committee voted to report (but did not actually report) with amendment S. J. Res. 149, supporting U. S. participation in relieving victims of hunger in India (p. D295) and was given until midnight, Apr. 5, to file a report (p. 7223).
Sen. Inouye expressed support of the food for India bill (p. 7232), and Sen. Clark commended the proposed Indian-American Foundation (pp. 7253-5).
16. CATTLE HIDES. Sens. Mansfield and Kennedy, Mass., spoke in support of new controls over the export of cattle hides and Sen. Mansfield inserted the testimony of Under Secretary of Commerce Collins on this subject. pp. 7200-1, 7241-2
17. MANPOWER. Received from Labor a report on manpower research and training for 1965. p. 7201
18. AGRICULTURAL PROGRAMS. Received from Idaho Legislature resolutions urging full appropriations for vocational education, agricultural research and extension work, financial aid to federally impacted school areas and experiment stations; urging enactment of the proposed Potato Labeling Act and establishment of the Sawtooth Mountains National Recreation Area and Wilderness. pp. 7201-4
19. SCHOOL MILK. Sen. Proxmire spoke in support of his bill to make the school milk program permanent at an increased level and inserted two Calif. resolutions supporting this proposed legislation. p. 7223
20. REA. Sen. Lausche spoke in support of his bills "to curb the unrealistic and unintended expansion of the Rural Electrification Administration and to bring about some equalization of the interest rates charged by the Treasury for REA loans and the amount the Treasury pays for its borrowings," and inserted a supporting article. pp. 7228-9

21. ESSAYS. Sen. Monroney inserted two winning essays, one on 4-H clubs and community living, the other on rural electric cooperatives. pp. 7235-6
22. ADMINISTRATIVE COUNSEL. Sen. Long, Mo., inserted an article, "Beware of All-American Mr. Fixit," exploring the aspects of the "ombudsman" system of investigating citizens' complaints against public officials. pp. 7229-30
23. POVERTY. Sen. Murphy commended and inserted an article by former Vice President Nixon, "We Can Still Win the War on Poverty." pp. 7242-3
24. TRANSPORTATION. Sen. Harris urged Congress "to be very cautious before approving this recommendation to create a new Department of Transportation." pp. 7248-9
25. INTERGOVERNMENTAL RELATIONS. Sen. Muskie commended and inserted an article discussing methods of bringing Federal, State and local governments into closer partnership. pp. 7233-5
26. PRICES. Sen. Pearson stated that "it would appear that the only rule or guideline that the administration is using" in connection with price and wage controls "is simply to apply pressure at those points where its enormous powers can be used most effectively" and expressed displeasure over the "decline in farm prices." p. 7255
Sen. McCarthy inserted an article, "Wage and Price Guideposts: They Are Too Abstract and Simple for Practical Implementation." pp. 7250-2
27. WATERSHEDS. Sen. McClellan expressed concern over the proposed limitation of the small watershed program. p. 7253
28. REA. Received a resolution from Mont. Farmers Union "favoring the enactment of legislation to provide adequate funds for loans under the Rural Electrification Administration." p. 7204
29. RECREATION. Received a Calif. State Legislature resolution "favoring the preservation of the California redwood trees." p. 7204

ITEMS IN APPENDIX

30. HOUSING. Rep. Barrett inserted Rep. Patman's address on the effect that the "tight money" situation and high interest rates have on the housing market and the President's Great Society programs. pp. A1939-41
31. CONSERVATION. Extension of remarks of Rep. Wright paying tribute to landowners for their leadership in soil and water conservation programs. p. A1945
32. OPINION POLL. Extension of remarks of Rep. Berry inserting the results of an opinion poll, including items of interest to this Department. p. A1947
33. FOREIGN AID. Extension of remarks of Rep. McClory inserting an article, "World's Illiquidity Tied To Economic Aid", and stating that it points out the disruptive economic situation that develops when programs of continuing foreign aid to the under-developed nations are carried on. pp. A1947-8
34. CONSUMER. Extension of remarks of Rep. Casey commending the administration's

reiteration, and expansion of a tentative proposal, economic experts in the executive branch have, with Presidential approval, created a national wage and price policy.

The rationale of the policy cannot be understood unless one examines the Council's analytical framework. In its restatement of the guideposts this year, it wrote:

"Most earlier periods of high employment since World War II have been accompanied by inflation. In some of those years the cause clearly was excessive demand. In other years no general excess of demand was evident, yet prices continued to creep upward. The movement continued even during some periods in which—on any reasonable criterion—overall demand was quite inadequate. The exact diagnosis remains a matter of some disagreement among economists. But almost all agree that an important part of the explanation lies in the fact that, in many industries, unions or managements, or both, possess considerable discretionary power to set wages and prices in ways not consistent with basic supply and demand forces in the market."

The numerous antitrust suits in recent years and the frequent conviction of business managers of our largest firms for rigging prices are only one kind of evidence that price-setting responds to something other than merely the competitive market. Quite as obviously, some unions, such as the steelworkers in the fifties, secured wage gains unattainable except for their strong bargaining position.

The Council thus sees the problem as keeping business and unions from pushing the economy into an inflation through administered prices and negotiated wages. It has little faith in general fiscal and monetary policies halting this kind of inflation, however useful they may be for containing inflation due to excess demand. The inflation that the Council asserts we face is caused by price and wage increases in a few concentrated sectors of the economy. Remedies such as general tax increases, cutbacks in total Government spending, or overall tightening of credit do not directly and specifically strike at the causes; they merely slow down the whole economy without having a direct impact on the particular wages and prices in question.

In the Council's judgment, traditional monetary and fiscal tools can control administered-price inflation only at the cost of significant unemployed labor and capital. Unemployment rates in excess 5 to 8 percent may be required to prevent increases in money wages. Excess plant capacity would also be required to restrain rises in the price of goods.

QUESTIONABLE ASSUMPTIONS

The Council's point of view, however, is subject to criticism. The two basic assumptions that underlie its position are not generally acceptable to all economists. First, the assumption that the economy is so non-competitive that inflation is likely to have its source in labor and management decisions has not been demonstrated on either a theoretical or empirical basis to the satisfaction of the majority of economists. More important, no economist has succeeded in providing a technique for identifying administered-price inflation. Thus if the Council cannot differentiate the source of the inflation with any great degree of confidence, is it justified in applying a selective policy tool that is designed to combat only one possible source of inflation?

The second questionable assumption is the need to halt moderate inflations. This involves not only the analysis of the consequences of inflation for continued economic expansion but also the value system of American society. Economists are divided in their opinions regarding the effect of moderate inflations on investment and possible recessions.

And our society may be just as divided over the desirability of incurring a moderate amount of inflation for the sake of a reduction in unemployment. Of course, the Council intends to eliminate the need for Americans to make the latter choice by seeking a policy that will render compatible the goals of full employment and price stability.

Nationwide compliance with the guideposts would by definition guarantee stability in the general price level. But how are the indicated wage and price changes related to the actual changes in a competitive market economy? That is, do economic theory and the past performance of the American economy (as it undertook the resource allocation function) provide any support for the guideposts?

An examination of the relationship between wages, prices, and productivity in a competitive economy suggests that in the long run they have behaved much as economic theory predicts they should. Industry prices have moved inversely to industry productivity. Prices of goods produced by industries with a productivity greater than the national average have fallen; by and large, the greater the rise of productivity, the greater the fall in prices. Industries with a smaller than average productivity gain have tended to raise their prices. Real wages generally have increased in both high and low productivity industries at the same average rate of about 2.4 percent per year. The guidepost policy is, therefore, attempting to simulate the operation of a free market economy by Government injunction.

The analysis underlying the guidepost policy, however, is far too simple to constitute a national wage and price policy. It is, first of all, merely a technical and theoretical examination of a few variables to which the economy responds. While the direction in which industry prices and wages move may match the long-run trends, the size of the change is also crucial if the market is not to be obstructed in an important function, that of allocating resources.

In the short run, wages and productivity have typically fluctuated more or less independently, and the inverse movement of prices and productivity has by no means been consistent. Wages and prices seldom respond directly and immediately to variations in productivity within a firm or an industry, let alone in the nation. Any short-term movements that coincide with changes in the national productivity trend are sheer happenstance. Wages and prices must and do respond to a variety of forces that play upon the market: the weather, enactment of new laws, Government programs, and expenditures, strikes, impact of foreign trade, new uses of labor, inventions and innovations, shifts in taste and demand, and adjustments in the quality of labor. While over-all productivity increases may ultimately influence and even set limits to fluctuations, they require no close correspondence at any one time.

INEQUITABLE ENFORCEMENT

The Council's analysis is inadequate to sustain a national policy also because it tries to reduce or escape issues of justice and equity—values—by pretending it is dealing only with technical matters through neutral techniques. It assumes that it has rendered "expert" and, therefore unbiased judgments on the most contentious, prickly and interest-laden issue in a business society. No greater constellation of powerful and vital interests can be found than those affected by the guideposts, for wage and price decisions influence jobs, investments, profits, costs and the distribution of income.

Surely only single-minded economic technicians could seriously expect a lone, abstract, technical concept such as productivity to govern such an array of interests. Fur-

ther, only naive experts would assert, as the Council did in January, that "public policy is and should remain neutral with respect to wage and price decisions that attempt to change the distribution of industry's income between labor and capital."

Neutrality has hardly governed enforcement of the guideposts. The administration's economic power is a subtle influence compounded of varying measures of prestige, respect, political rewards and penalties, and the ability of officials to activate market pressures. The latter may well be the most important. Thus the opportunistic use of available power, not neutrality, determines the use of guideposts.

If the guideposts are not voluntarily followed, the Council, with small staff and limited resources, must choose carefully its attempts at enforcement. Clearly the relatively few large firms in the steel industry and the big United Steelworkers of America present a more attractive target for regulation than the construction industry, which is fragmented into thousands of widely scattered firms and more than a dozen major unions.

Steel prices and wages, for example, have received much of the Council's and the President's attention. Last year they insisted that wage increases for the half-million workers be held to 3.2 percent (computed over the 39-month period of the agreement). More recently they forcefully interfered to restrain the industry's attempt to raise prices. After trying for an increase twice as large, the steel firms agreed to a Council suggestion that an increase of \$2.75 a ton was desirable.

In contrast the construction industry, which provides jobs for over three million men (six times the number in steel), has not been touched by Government action. Though wages rose by over 4 percent in 1965, and some workers negotiated increases up to 15 percent, the Council has found no effective way to apply the guideposts. Even though the Government will spend nearly \$9 billion on public-works construction this year, the projects are so decentralized and the wage and price decisions made at such a local level that enforcement of the guideposts is nearly impossible.

One can understand why the administration "guides" the steel industry but does not act in construction. To lend credibility to its policy it must seek enforcement where success is more likely. But to pretend that it chooses its targets impartially and applies its guideposts equitably fools no one, unless the Council members are fooling themselves.

The administration has enforced its policy upon other industries for reasons that appear to have little to do with their "key" position. Holding large stockpiles of aluminum, copper, and a hundred other products ranging from uranium to duckfeathers, it is in a powerful bargaining position, as Alcoa and others found when the President made use of it. Lacking any stockpile of aluminum workers, though, he notably did not try to enforce the guideposts when the union won a wage increase larger than the guideposts allowed. The threat of dumping the stockpiles to prevent price increases was effective, to be sure, but it also introduced another element of arbitrariness and capriciousness into the enforcement since the Government does not stockpile the products of all key industries. The inequities that result when some important industries are bound to the guideposts while others are not outrage the sense of justice of businessmen and unionists; they may also misallocate resources and distort the patterns of investment.

More serious than the arbitrary, opportunistic appeals to the guidepost policy has been the administration's inability or unwillingness to seek price cuts where industry productivity exceeds the national trend.

Last year, according to Council statistics, labor costs per unit of production declined in manufacturing by 0.8 percent but prices did not drop. The declining unit labor costs, accompanied in some cases by rising prices, enabled many business firms to record generous profits. Average earnings for the 500 largest industrial corporations rose 16 percent in 1965, ranging from 5.9 percent for steel to 38.9 percent for airlines (only ship-lines declined). General Motors alone showed profits of \$3.1 billion, an increase of 23 percent. The Council in 1964 called attention to the problems that would result from a failure to cut prices. "Such profits become highly visible to the public and constitute a lure for strongly intensified wage demands."

Workers or dissident opposition groups within unions want to know why they should not enjoy more of the fruits of good times and the productivity gains accruing to stockholders. For instance, negotiators for the auto workers will surely aim for wage increases greater than 3.2 percent. Invidious comparisons will drive unions that abided by the guides to bargain for larger, matching increases. The guideposts may then become only silent markers of a dead policy.

Should the administration succeed in tying forthcoming wage increases to the guideposts despite the attractive pull of soaring profits, unions could still find ways to escape. As they have done in previous periods of wage restraints, they would negotiate productivity, piece-rate or incentive provisions that allow workers to earn bonuses for extra work. Though rates might remain firmly tied to the guideposts, earnings would be free to roam—and rise—depending upon how loosely the provisions were drawn and administered. Or, alternatively, management might find it expedient to stay formally within the wage guides but to begin to upgrade workers to higher paying classifications.

Finally, the guideposts are now essentially a selective tool in danger of becoming corrupted. The method of calculating them was changed by the Council in January 1966 because it gave the wrong answer. Retention of the old method of calculating national trend productivity (a 5-year moving average of the annual change in output per man-hour) would have resulted in a figure of 3.6 percent. The Council switched to an unidentified method without really explaining why the old one was no longer applicable. It was unwilling to admit that no economist knows how to calculate the trend level of productivity that the economy can sustain with full employment and price stability. If the guideposts were initially devised to assist the public in evaluating wage and price changes, what will the public use to judge changing guidepost calculations by the administration?

We conclude that the guideposts have considerable merit in that they recognize the need for responsible decisionmaking by those who possess economic power. Unfortunately the President's Council has not limited them to this purpose but has made them into an operating policy of government. They rest on too abstract and too simple assumptions to carry the load of practical implementation. In addition, the Council seems unaware that the guideposts are not value free, that in their actual, selective effect they inevitably play with the interests and welfare of labor and business. Small wonder, therefore, that both are united in their criticism and opposition to the policy.

Mr. McCARTHY. Mr. President, James Kuhn and Maurice Wilkinson, both of whom teach at the Graduate School of Business of Columbia University, have raised some significant questions concerning the wage and guide-

posts which are now in effect and some other questions in the area of economics relating to the basis upon which these guidelines or guideposts supposedly have been established and are being applied.

Their conclusion is that the guideposts have considerable merit in that they recognize the need for responsible decisionmaking by those who possess economic power. Unfortunately, the President's Council has not limited them to this purpose, but has made them into an operating policy of government, without authority from Congress. They rest on too-abstract and too-simple assumptions to carry the load of practical implementation. In addition, the Council seems unaware that the guideposts are not value free, that in their actual, selective effort they inevitably play with the interests and welfare of labor and business. Small wonder, therefore, that both are united in their criticism and opposition to the policy.

It is time for Congress to examine the manner in which the wage and guideposts are established and applied. It is my judgment that, if they are to be effective in the direction of the control of American economy, there should be legislative action on the part of Congress.

NATIONAL PROGRAM OF WATER RESEARCH

Mr. JACKSON. Madam President, I ask that the Chair lay before the Senate the amendment of the House of Representatives to S. 22.

The PRESIDING OFFICER (Mrs. NEUBERGER in the chair) laid before the Senate the amendment of the House of Representatives to the bill (S. 22) to promote a more adequate national program of water research, which was, to strike out all after the enacting clause and insert:

That section 200 of the Water Resources Research Act of 1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to read as follows:

"Sec. 200. (a) There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience, and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State, and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

"(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than

three calendar days to a day certain or an adjournment sine die."

Sec. 2. The last paragraph of section 104 of said Act is hereby repealed and a new section 307 is added to that Act reading as follows:

"Sec. 307. The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor."

Mr. JACKSON. Madam President, I move that the Senate concur in the House amendment.

The motion was agreed to.

STATE AND MUNICIPAL BOND WEEK—HOUSE JOINT RESOLUTION 837

Mr. DIRKSEN. Madam President, I ask that the Chair lay before the Senate House Joint Resolution 837, authorizing and requesting the President of the United States to issue a proclamation designating the week beginning April 17, 1966, as "State and Municipal Bond Week."

The PRESIDING OFFICER laid before the Senate the joint resolution (H.J. Res. 837) to authorize the President to proclaim the week beginning April 17, 1966, as "State and Municipal Bond Week," which was read twice by its title.

Mr. DIRKSEN. Madam President, municipal bonds must be issued to finance many facilities. Unlike the Federal Government, local governments cannot collect enough tax revenues to treat their capital outlays as current expenses and pay for all buildings in the year when the work is put in place.

The municipal bond is the most democratic of all financial instruments. The bonds are issued only after approval by voters who have considered the taxes they will have to pay, or the other revenues that will have to be obtained to meet the scheduled principal and interest payments.

I favor asking the President to proclaim "State and Municipal Bond Week" for the week beginning April 17, so that the public may be reminded of the continuing benefits to community life and employment which these securities make possible, and may be reminded of the privilege to participate in municipal bond elections and of their opportunity to manage their own investment funds well for the benefit of their communities.

Madam President, I ask for immediate consideration of House Joint Resolution 837.

The PRESIDING OFFICER. Is there objection to the present consideration of the joint resolution?

There being no objection, the joint resolution was considered, ordered to be engrossed for third reading, read the third time, and passed.



Public Law 89-404
89th Congress, S. 22
April 19, 1966

An Act

To promote a more adequate national program of water research.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 200 of the Water Resources Research Act of 1964 (78 Stat. 331, 42 U.S.C. 1961b) is hereby amended to read as follows:

Water research
program.

"Sec. 200. (a) There are authorized to be appropriated to the Secretary of the Interior \$5,000,000 for the fiscal year 1967, \$6,000,000 for the fiscal year 1968, \$7,000,000 for the fiscal year 1969, \$8,000,000 for the fiscal year 1970, \$9,000,000 for the fiscal year 1971, and \$10,000,000 for each of the fiscal years 1972-1976, inclusive, from which appropriations the Secretary may make grants to and finance contracts and matching or other arrangements with educational institutions, private foundations or other institutions, with private firms and individuals whose training, experience, and qualifications are, in his judgment, adequate for the conduct of water research projects, and with local, State, and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior which he may deem desirable and which are not otherwise being studied.

Appropriations.

80 STAT. 129

80 STAT. 130

"(b) No grant shall be made, no contract shall be executed, and no matching or other arrangement shall be entered into under subsection (a) of this section prior to sixty calendar days from the date the same is submitted to the President of the Senate and the Speaker of the House of Representatives and said sixty calendar days shall not include days on which either the Senate or the House of Representatives is not in session because of an adjournment of more than three calendar days to a day certain or an adjournment sine die."

Transmittal to
Congress.

SEC. 2. The last paragraph of section 104 of said Act is hereby repealed and a new section 307 is added to that Act reading as follows:

Repeal.

42 USC 1961a-4.

"SEC. 307. The Secretary shall make a report to the President and Congress on or before March 1 of each year showing the disposition during the preceding calendar year of moneys appropriated to carry out this Act, the results expected to be accomplished through projects financed during that year under sections 101 and 200 of this Act, and the conclusions reached in or other results achieved by those projects which were completed during that year. The report shall also include an account of the work of all institutes financed under section 100 of this Act and indicate whether any portion of an allotment to any State was withheld and, if so, the reasons therefor."

Report to Pres-
ident and
Congress.

Approved April 19, 1966.

(over)

LEGISLATIVE HISTORY:

HOUSE REPORT No. 1350 accompanying H.R. 3606 (Comm. on Interior & Insular Affairs).

SENATE REPORT No. 127 (Comm. on Interior & Insular Affairs).

CONGRESSIONAL RECORD:

Vol. 111 (1965): Mar. 25, considered and passed Senate.

Vol. 112 (1966): Mar. 30, considered and passed House, amended, in lieu of H.R. 3606.

Apr. 5, Senate concurred in House amendment.